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NATIONAL DAM INSPECTION PROGRAM. PAGE'S LAKE DAM NOI NUMBER PA --ETC(U)  
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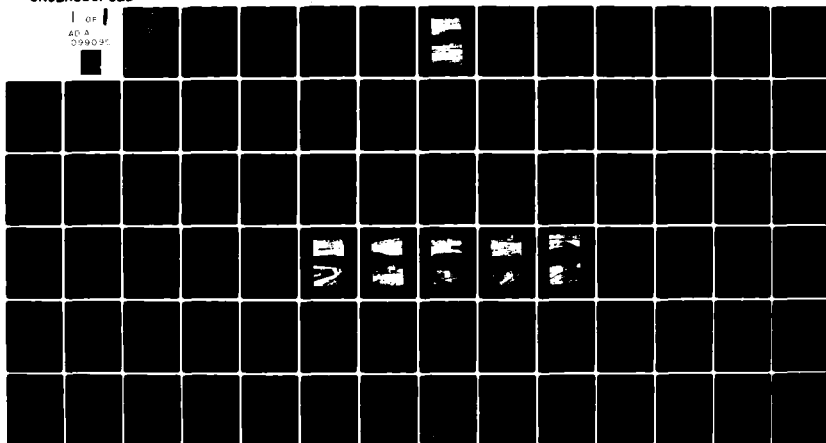
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SUSQUEHANNA RIVER BASIN,  
SALT LICK CREEK, SUSQUEHANNA COUNTY,  
PENNSYLVANIA

② National Dam Inspection Program

**PAGE'S LAKE DAM**

(Number)

(NDI No. PA 00062

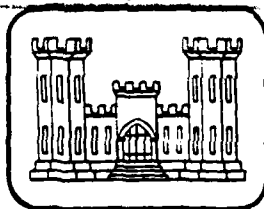
PennDER No. 58-5)

~~Dam Owner: Lakeside Outing Club.~~

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**PHASE I INSPECTION REPORT.**  
**NATIONAL DAM INSPECTION PROGRAM**

①⑤ DACW 31-81-C-0011



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①② 85

prepared for

**DEPARTMENT OF THE ARMY**  
**Baltimore District, Corps of Engineers**  
Baltimore, Maryland 21203

prepared by

**MICHAEL BAKER, JR., INC.**

Consulting Engineers  
4301 Dutch Ridge Road  
Beaver, Pennsylvania 15009

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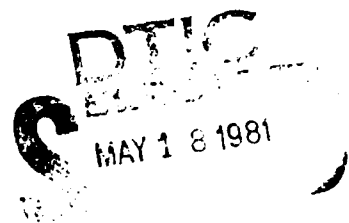
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SUSQUEHANNA RIVER BASIN

PAGE'S LAKE DAM  
SUSQUEHANNA COUNTY, COMMONWEALTH OF PENNSYLVANIA  
NDI No. PA 00062  
PennDER No. 58-5

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM



Prepared for: DEPARTMENT OF THE ARMY  
Baltimore District, Corps of Engineers  
Baltimore, Maryland 21203

Prepared by: MICHAEL BAKER, JR., INC.  
Consulting Engineers  
4301 Dutch Ridge Road  
Beaver, Pennsylvania 15009

February, 1981

DISTRICT
Approved by
Distribution

## PREFACE

This report is prepared under guidance contained in the "Recommended Guidelines for Safety Inspection of Dams," for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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PHASE I REPORT  
NATIONAL DAM INSPECTION PROGRAM

Page's Lake Dam, Susquehanna County, Pennsylvania  
NDI No. PA 00062, PennDER No. 58-5  
Salt Lick Creek  
Inspected 27 October 1980

ASSESSMENT OF  
GENERAL CONDITIONS

Page's Lake Dam is owned and operated by the Lakeside Outing Club and is classified as a "Significant" hazard - "Intermediate" size dam. The dam was found to be in good overall condition on 27 October 1980.

Hydraulic/hydrologic evaluations, performed in accordance with procedures established by the Baltimore District, Corps of Engineers, for Phase I Inspection Reports, revealed that the spillway will not pass the 1/2 Probable Maximum Flood (1/2 PMF) without overtopping the dam. A spillway design flood (SDF) in the range of the 1/2 PMF to the Probable Maximum Flood (PMF) is required for Page's Lake Dam. The 1/2 PMF was chosen as the SDF because the dam is on the low end of the "Intermediate" size category in terms of storage. During the 1/2 PMF, the dam is overtopped by a maximum depth of 3.34 feet for a total duration of 11.83 hours. The spillway is therefore considered "Inadequate." It is recommended that the owner immediately initiate an engineering study to further evaluate the spillway capacity and develop recommendations for remedial measures to reduce the overtopping potential of the dam.

Several items of remedial work should be performed by the owner without delay. Item 1 below should be completed by a qualified professional engineer experienced in the design of hydraulic structures for dams. These include:

- 1) Initiate an engineering study to further evaluate the spillway capacity and develop recommendations for remedial measures to reduce the overtopping potential of the dam.
- 2) Fill the erosion gully located to the left of the spillway and reseed the area.
- 3) Remove the brush below the downstream face of the dam.
- 4) Remove the debris and obstructive vegetation from the downstream channel.

## PAGE'S LAKE DAM

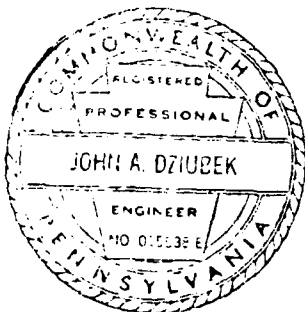
In addition, the following operational measures are recommended to be undertaken by the owner:

- 1) Develop a detailed emergency operation and warning system.
- 2) During periods of unusually heavy rain, provide around-the-clock surveillance of the dam.
- 3) When warning of a storm of major proportions is given by the National Weather Service, activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, and operation procedures and records be developed and implemented. A plan for emergency drawdown of the reservoir should be prepared in case an emergency drawdown should become necessary. These should be included in a formal maintenance and operations manual for the dam.

Submitted by:

MICHAEL BAKER, JR., INC.



*John A. Dziubek*  
John A. Dziubek, P.E.  
Engineering Manager-Geotechnical

Date: 19 February 1981

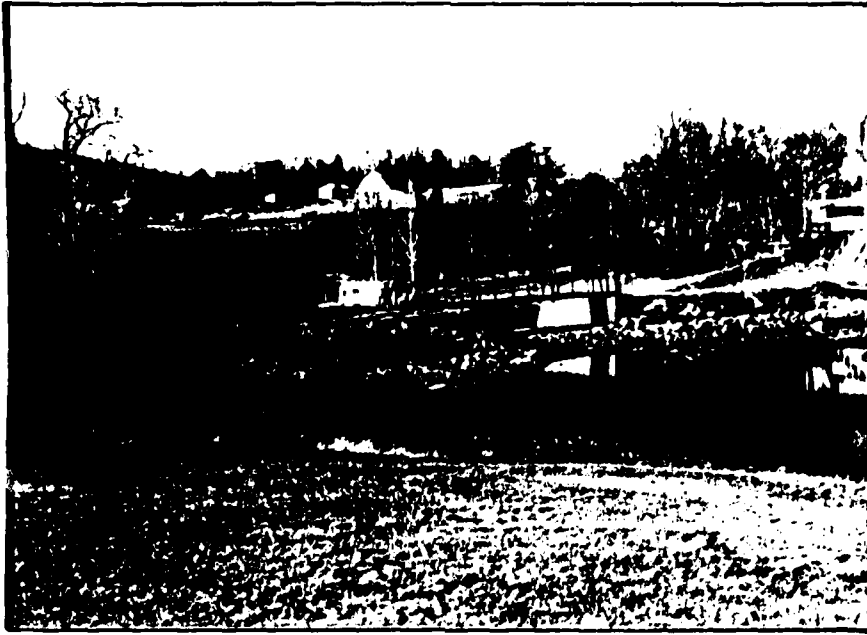
Approved by:

DEPARTMENT OF THE ARMY  
BALTIMORE DISTRICT, CORPS OF ENGINEERS

*James W. Peck*  
JAMES W. PECK  
COL, Corps of Engineers  
District Engineer

Date: 13 MAR 81

## PAGE'S LAKE DAM



OVERALL VIEW OF UPSTREAM FACE OF DAM FROM LEFT ABUTMENT



OVERALL VIEW OF DOWNSTREAM FACE OF DAM FROM RIGHT ABUTMENT

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PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM  
PAGE'S LAKE DAM  
NDI No. PA 00062, PennDER No. 58-5

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

- a. Authority - The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.
- b. Purpose of Inspection - The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

- a. Description of Dam and Appurtenances - Page's Lake Dam is a dry masonry dam with a concrete core wall. The embankment is 162 feet long and 15 feet high. The embankment has a crest width of 13 feet and an upstream slope of 1.5H:1V (Horizontal to Vertical). The downstream face is a vertical stone wall. The dam has a concrete core wall which extends the entire length of the embankment.

The spillway, located in the center of the dam, consists of a concrete broad crested weir. The weir is 40 feet long perpendicular to the direction of flow. The spillway training walls are concrete and extend 4.5 feet above the crest of the spillway. At the downstream face of the embankment, the discharge falls 9.0 feet into a rock-lined plunge pool. A small pedestrian bridge with no piers in the spillway channel crosses over the spillway.

The outlet works for the dam are located at the left abutment. The intake consists of a concrete box with stop logs and a trash rack. It discharges into a 24 inch reinforced concrete pipe which conveys the water to a riprap-lined ditch on the downstream side of the dam.

- b. Location - Page's Lake Dam is located on Salt Lick Creek, approximately 3.75 miles east-southeast of New Milford, Pennsylvania. The structure is

located in New Milford Township, Susquehanna County, Pennsylvania. The coordinates of the dam are N 41° 51.5' and W 75° 39.5'. The dam can be found on USGS 7.5 minute topographic quadrangle, Harford, Pennsylvania.

- c. Size Classification - The height of the dam is 15 feet. Storage at the top of the dam [Elevation 1436.2 feet Mean Sea Level (ft. M.S.L.)] is 1,430 acre-feet. The dam is therefore in the "Intermediate" size category.
- d. Hazard Classification - Three structures, one home and three garages, and two roads are located 1,000 feet and 700 feet downstream of the dam, respectively. There would be economic damage to these structures and roads if the dam were to fail; however, no loss of life is believed likely to occur. Purdy Dam, which is classified as "Significant" hazard, is located 1,400 feet downstream of Page's Lake. In the event of a failure, Purdy Dam would be overtopped. Therefore, Page's Lake Dam is considered to be in the "Significant" hazard category.
- e. Ownership - The dam is owned and operated by the Lakeside Outing Club, Mr. David Mowry, President, R.D. 2, New Milford, Pennsylvania 18834.
- f. Purpose of Dam - The impoundment created by the dam was originally used for water power but is now used for recreation.
- g. Design and Construction History - Page's Lake Dam was originally constructed sometime in the 1860's. The dam was reconstructed in 1922 as a dry masonry dam. Later (date unknown) a concrete core wall was constructed in the earthfill upstream slope. Additional information concerning repairs made to the dam is contained in Section 2 of this report.
- h. Normal Operational Procedures - The reservoir is typically maintained at the spillway crest elevation (Elevation 1433.0 ft. M.S.L.) during the summer. In the early fall, the lake is drawn down 3 to 4 feet to allow for boat dock repairs.

### 1.3 PERTINENT DATA

- a. Drainage Area (square miles) - 4.78

- b. Discharge at Dam Site (c.f.s.) -
- |  |         |
|--|---------|
| Maximum Flood -  | Unknown |
| Spillway Capacity at Maximum Pool<br>(El. 1436.2 ft. M.S.L.) - | 710     |
- c. Elevation (feet above M.S.L.)\* -
- |                               |         |
|-------------------------------|---------|
| Design Top of Dam -           | Unknown |
| Minimum Top of Dam -          | 1436.2  |
| Maximum Design Pool -         | Unknown |
| Spillway Crest -              | 1433.0  |
| Streambed at Toe of Dam -     | 1421.5  |
| Maximum Tailwater of Record - | Unknown |
- d. Reservoir (feet) -
- |   |      |
|---|------|
| Length of Maximum Pool<br>(El. 1436.2 ft. M.S.L.) - | 8800 |
| Length of Normal Pool<br>(El. 1433.0 ft. M.S.L.) -  | 6600 |
- e. Storage (acre-feet) -
- |                                       |      |
|---------------------------------------|------|
| Top of Dam (El. 1436.2 ft. M.S.L.) -  | 1430 |
| Normal Pool (El. 1433.0 ft. M.S.L.) - | 970  |
- f. Reservoir Surface (acres) -
- |                                       |     |
|---------------------------------------|-----|
| Top of Dam (El. 1436.2 ft. M.S.L.) -  | 110 |
| Normal Pool (El. 1433.0 ft. M.S.L.) - | 100 |
- g. Dam -
- Type - Dry masonry dam with a concrete core wall in earthfill upstream section
- |                          |                          |
|--------------------------|--------------------------|
| Total Length (feet) -    | 162                      |
| Height (feet) - Design - | Unknown                  |
| Field -                  | 15                       |
| Top Width (feet) -       | 13                       |
| Side Slopes - Upstream - | 1.5H:1V                  |
| Downstream -             | Vertical<br>(stone wall) |
- Zoning - The upstream slope is earth and rockfill.  
A concrete core wall is located upstream of the centerline of the dam. Downstream of the core wall the dam consists of dry masonry stone except for the top 3 feet which is earthfill.

\*All elevations are referenced to the spillway crest of the dam, Elevation 1433.0 ft. M.S.L., as measured on the available plans for the dam (Plate 4, Appendix E).

Impervious Core -	Concrete
Cut-off -	core wall
Drains -	Concrete
	core wall
	None
h. <u>Diversion and Regulating Tunnels</u> -	None
i. <u>Spillway</u> -	
Type - Broad crested concrete weir	
Location - Center of dam	
Width of Crest Parallel to	
Flow (feet) -	17
Length of Crest Perpendicular	
to Flow (feet) -	40
Crest Elevation (ft. M.S.L.) -	1433.0
Gates -	None
Downstream Channel - Riprapped plunge pool	
j. <u>Outlet Works</u> - The outlet works for the dam are	
located at the left abutment. The intake consists	
of a concrete box with stop logs and a trash rack.	
It discharges into a 24 inch reinforced concrete	
pipe which conveys the water to a riprap-lined	
ditch on the downstream side of the dam.	

## SECTION 2 - ENGINEERING DATA

### 2.1 DESIGN

The information reviewed consisted of File 18-5 of the Pennsylvania Department of Environmental Resources (PennDER). This file contained the following information:

- 1) A letter, dated 29 May 1913, from the Burgess of New Milford, Pennsylvania, informing the Pennsylvania State Water Commission of the dangerous condition of the Page's Lake Dam.
- 2) A report, dated 6 August 1913, written by the Water Supply Commission of Pennsylvania, describing the history and condition of the Page's Lake Dam.
- 3) A directive, dated 14 November 1913, to the New Milford Light and Power Company, directing them to secure the services of an engineer to reconstruct the spillway and repair where the dam was breached in the 1890's.
- 4) Various correspondence between the Water Supply Commission and the Susquehanna County Electric Company who purchased the New Milford Light and Power Company, concerning the required repairs on the dam.
- 5) An application submitted by the Susquehanna County Electric Company, dated 17 December 1913, to the Water Supply Commission of Pennsylvania for repairs to the dam. Also included was the subsequent approval given by the Water Supply Commission of Pennsylvania, dated 4 February 1914.
- 6) An inspection report on the repairs to the Page's Lake Dam filed by the Water Supply Commission on 14 December 1914, stating that the repairs to the dam were inadequate and not according to plans submitted to the Commission. A letter from the Water Supply Commission, dated 16 December 1914, directed the Susquehanna County Light & Power Company to make corrective repairs.
- 7) Various memorandum and letters between the Water Supply Commission of Pennsylvania and the Susquehanna County Light & Power Company, regarding repairs of breaching of the dam.

- 8) A letter, dated 3 November 1921, from the Lakeside Outing Club, informing the Water Supply Commission of Pennsylvania that they had purchased the dam and would like to start repairs at once.
- 9) The last post-construction inspection made by PennDER on 17 August 1965. It reported no major problems.

## 2.2 CONSTRUCTION

The information reviewed consisted of File 58-5 of the Pennsylvania Department of Environmental Resources (PennDER). The contractor responsible for construction of the original dam in the 1860's is not known. The file contained the following information:

- 1) A letter, dated 17 August 1922, to the Water Supply Commission of Pennsylvania from the Lakeside Outing Club, stating that they would be starting repairs immediately. The contractor making the repairs was Mr. Will Kenyor.
- 2) A letter, dated 15 September 1922, from the Lakeside Outing Club to the Water Supply Commission, stating that the dam was nearing completion of repairs.
- 3) Directive from the Water Supply Commission, dated 15 November 1935, to the Lakeside Outing Club, directing them to remove the fish screens in front of the spillway.
- 4) The Lakeside Outing Club replaced the spillway with a 4 inch reinforced concrete spillway in October 1946.
- 5) The Water and Power Resources Board granted a permit to the Lakeside Outing Club on 18 May 1950 to construct a foot bridge over the spillway.
- 6) In October 1964 the concrete wing walls on the spillway were replaced.
- 7) A drawdown control structure was constructed in May 1975 in the left abutment of the dam. A 24 inch reinforced concrete pipe runs through the dam.

### 2.3 OPERATION

The Lakeside Outing Club is responsible for all operation and maintenance.

### 2.4 EVALUATION

- a. Availability - The information reviewed is readily available from PennDER's File No. 58-5.
- b. Adequacy - The information available is adequate for Phase I Inspection of this dam.
- c. Validity - There is no reason at the present time to doubt the validity of the available engineering data.

## SECTION 3 - VISUAL INSPECTION

### 3.1 FINDINGS

- a. General - The dam and its appurtenant structures were found to be in good overall condition on 27 October 1980. No unusual weather conditions were experienced during the inspection. Noteworthy deficiencies observed during the visual inspection are described briefly in the following paragraphs. The complete visual inspection check list, field sketch, top of dam profile, and typical cross-section are given in Appendix A.
- b. Dam - A small erosion gully has formed at the junction of the left spillway training wall and embankment. Brush was present immediately below the downstream face of the dam.
- c. Appurtenant Structures - The lake was drawn down for seasonal repair of the boat docks. No significant problems in the outlet works were observed.
- d. Reservoir Area - The reservoir slopes are gentle on the left side and moderate on the right. The majority of the shoreline has been developed with recreational cottages. The average depth of the reservoir is approximately 10 feet.

Fuller's Lake Dam (NDI No. PA 00073, PennDER No. 58-121) is located 9300 feet upstream from Page's Lake. Fuller's Lake Dam is a 143 feet long, 9 feet high, earthfill embankment. This dam controls 0.95 square miles of the drainage area which is a tributary to Page's Lake Dam. A Phase I Inspection Report is currently being prepared for this dam.

- e. Downstream Channel - The downstream channel contains some debris and obstructive vegetation which should be removed. The channel is moderately sloped and passes under a township road approximately 800 feet downstream of the dam. A 7 foot diameter corrugated metal pipe (C.M.P.) is the culvert under this first road. The channel then passes under PA Route 492, 500 feet further downstream, through a 5 foot high by 18 foot wide concrete culvert. In addition to possible economic damage to these two roads, one home and several (3) barns and garages could be damaged in the event of failure of the dam. Purdy (Stump Pond) Dam (NDI No. PA 00063, PennDER No. 58-11) is located 1,400 feet downstream. A Phase I Inspection Report is currently being prepared for this dam.



## SECTION 4 - OPERATIONAL PROCEDURES

### 4.1 PROCEDURES

There are no formal procedures for operating the reservoir or evacuating the downstream area in case of an impending failure of the dam. It is recommended that formal emergency procedures be adopted, prominently displayed, and furnished to all operating personnel.

### 4.2 MAINTENANCE OF DAM

Maintenance of the dam is performed by the owner on an as-needed basis. Generally, the maintenance procedures followed are adequate.

### 4.3 MAINTENANCE OF OPERATING FACILITIES

The stop logs are removed from the drawdown control structure every fall and the trash rack and spillway are cleaned of debris as required. A plan for emergency drawdown of the reservoir should be prepared in case emergency drawdown should become necessary.

### 4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

There is no warning system in the event of a dam failure. An emergency warning system should be developed.

### 4.5 EVALUATION OF OPERATIONAL ADEQUACY

The current operational features are adequate for the purpose they serve. However, it is recommended that a formal maintenance and operations manual be prepared for the dam.

## SECTION 5 - HYDRAULIC/HYDROLOGIC

### 5.1 EVALUATION OF FEATURES

- a. Design Data - No hydrologic or hydraulic design calculations are available for Page's Lake Dam.
- b. Experience Data - No information concerning the effects of significant floods on the dam is available.
- c. Visual Observations - During the visual inspection, no problems were observed which would indicate that the dam and appurtenant facilities could not perform satisfactorily during a flood event.

The right spillway training wall has cracks and spalling on the downstream face. However, this is not considered significant enough at this time to require repair.

Fuller's Lake Dam (NDI No. 00073) is 9300 feet upstream from Page's Lake. Fuller's Lake Dam is an earthfill dam 143 feet long and 9 feet high, with a trapezoidal earth spillway.

- d. Overtopping Potential - Page's Lake Dam is an "Intermediate" size - "Significant" hazard dam requiring evaluation for a spillway design flood (SDF) in the range of the 1/2 Probable Maximum Flood (1/2 PMF) to the Probable Maximum Flood (PMF). Because the dam is on the low end of the "Intermediate" size category in terms of storage capacity, the 1/2 PMF was chosen as the SDF.

The hydraulic capacity of the dam, reservoir, and spillway was assessed by utilizing the U.S. Army Corps of Engineers' Flood Hydrograph Package, HEC-1 DB. The hydrologic characteristics of the basin, specifically, the Snyders' unit hydrograph parameters, were obtained from a regionalized analysis conducted by the Baltimore District of the U.S. Army Corps of Engineers. The hydrograph from Fuller's Lake Dam was routed downstream to Page's Lake, combined with the runoff hydrograph for Page's Lake, and then routed through Page's Lake Dam.

The spillway is capable of passing only 15 percent of the PMF before overtopping begins. Analysis of the dam and spillway shows that the dam will be overtopped by a maximum depth of 3.34 feet for a total duration of 11.83 hours by the SDF.

- e. Spillway Adequacy - As outlined in the above analysis, the spillway will not pass the SDF without overtopping the dam; therefore, the spillway is considered "Inadequate."

## SECTION 6 - STRUCTURAL STABILITY

### 6.1 EVALUATION OF STRUCTURAL STABILITY

- a. Visual Observations - There were no structural inadequacies noted during the visual inspection that cause concern for the structural stability of the dam.
- b. Design and Construction Data - No design or construction data were available for review. Generally, for this type of dam, if the ratio of the width of the stonewall portion of the dam is greater than 0.5 times the height of the dam ( $0.5 w/h$ ), then stability of the dam due to overturning or sliding is not a problem. (Reference: "Evaluation and Repair of Stonewall-earth Dams," by Kent A. Healy, Proceedings of "Safety of Small Dams" conference, New England College, Henniker, New Hampshire, August 4-9, 1974, pp. 149-178). The  $w/h$  ratio for this dam is estimated at slightly less than one and no signs of instability were observed during the visual inspection, therefore, further assessments of the structural stability are not considered necessary.
- c. Operating Records - No operating records are available. Nothing in the procedures described by the owner's representative indicates concern for the structural stability of the dam.
- d. Post-Construction Changes - No changes adversely affecting the structural stability of the dam have been performed.
- e. Seismic Stability - The dam is located in Seismic Zone 1 of the "Seismic Zone Map of the Contiguous United States," Figure 1, page D-30, "Recommended Guidelines for Safety Inspection of Dams." This is a zone of minor seismic activity. Therefore, further consideration of the seismic stability is not warranted.

## SECTION 7 - ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

### 7.1 DAM ASSESSMENT

- a. Safety - Page's Lake Dam was found to be in good overall condition at the time of inspection. Page's Lake Dam is a "Significant" hazard - "Intermediate" size dam requiring a spillway capacity in the range of the 1/2 PMF to the PMF. Because the dam is on the low end of the "Intermediate" size category in terms of storage capacity, the 1/2 PMF was chosen as the SDF. As presented in Section 5, the spillway and reservoir are not capable of passing the 1/2 PMF without overtopping the dam. During the 1/2 PMF, the dam is overtopped by a maximum depth of 3.34 feet for a total duration of 11.83 hours. Therefore, the spillway is considered "Inadequate."
- b. Adequacy of Information - The information available and the observations made during the visual inspection are considered sufficient for this Phase I Inspection Report.
- c. Urgency - The owner should immediately initiate the further evaluation discussed in paragraph 7.1.d.
- d. Necessity for Additional Data/Evaluation - The hydraulic/hydrologic analysis performed in connection with this Phase I Inspection Report has indicated the need for additional spillway capacity. It is recommended that the owner immediately initiate an engineering study to further evaluate the spillway capacity and develop recommendations for remedial measures to reduce the overtopping potential of the dam.

### 7.2 RECOMMENDATIONS/REMEDIAL MEASURES

The inspection revealed certain items of remedial work which should be performed by the owner without delay. Item 1 below should be completed by a qualified professional engineer experienced in the design of hydraulic structures for dams. These include:

- 1) Initiate an engineering study to further evaluate the spillway capacity and develop recommendations for remedial measures to reduce the overtopping potential of the dam.

- 2) Fill the erosion gully located to the left of the spillway and reseed the area.
- 3) Remove the brush below the downstream face of the dam.
- 4) Remove the debris and obstructive vegetation from the downstream channel.

In addition, the following operational measures are recommended to be undertaken by the owner:

- 1) Develop a detailed emergency operation and warning system.
- 2) During periods of unusually heavy rain, provide around-the-clock surveillance of the dam.
- 3) When warning of a storm of major proportions is given by the National Weather Service, activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, and operation procedures and records be developed and implemented. A plan for emergency drawdown of the reservoir should be prepared in case an emergency drawdown should become necessary. These should be included in a formal maintenance and operations manual for the dam.

APPENDIX A

VISUAL INSPECTION CHECK LIST, FIELD SKETCH,  
TOP OF DAM PROFILE, AND TYPICAL CROSS-SECTION

Check List  
Visual Inspection  
Phase 1

Name of Dam Page's Lake Dam County Susquehanna State PA Coordinates Lat. N 41°51.5'  
 NDI # PA 00062  
 Pennder # 58-5 Long. W 75°39.5'  
 Date of Inspection 27 October 1980 Weather Sunny Temperature 40° F.

Pool Elevation at Time of Inspection 1430.23 ft.\* M.S.L. Tailwater at Time of Inspection 1421.51 ft.\* M.S.L.

\*Datum Elevation 1433.0 ft. M.S.L. for the spillway crest taken from plans of the dam,  
 Plate 4.

Inspection Personnel:

Michael Baker, Jr., Inc.:

James G. Uliniski  
 Wayne D. Lasch  
 Jeffrey S. Maze

Owner's Representatives:

Lakeside Outing Club  
 Mrs. Margaret Ward, Secretary  
 (interviewed 31 October 1980)

James G. Uliniski Recorder



## MASONRY DAMS

Name of Dam: PAGE'S LAKE DAMNDI # PA 00062

<u>VISUAL EXAMINATION OF</u>		<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
LEAKAGE		None observed	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS		Small erosion gully along left training wall and embankment.	Fill in gully and reseed area.
DRAINS		None observed	
WATER PASSAGES		None observed	
FOUNDATION		No problems observed	

## MASONRY DAMS

Name of Dam: PAGE'S LAKE DAM

NDI # PA 00062

VISUAL EXAMINATION OF		OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES		No problems observed	
STRUCTURAL CRACKING		No problems observed	
VERTICAL AND HORIZONTAL ALIGNMENT		Good	
MONOLITH JOINTS		Not Applicable	
CONSTRUCTION JOINTS		Not Applicable	

EMBANKMENT - Not Applicable

Name of Dam PAGE'S LAKE DAM

NDI # PA 00062

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

SURFACE CRACKS

UNUSUAL MOVEMENT OR  
CRACKING AT OR BEYOND  
THE TOE

SLOUGHING OR EROSION OF  
EMBANKMENT AND ABUTMENT  
SLOPES

EMBANKMENT - Not Applicable

Name of Dam PAGE'S LAKE DAM  
 NDI # PA 00062

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

VERTICAL AND HORIZONTAL  
 ALIGNMENT OF THE CREST

\_\_\_\_\_  
 RIPRAP FAILURES

\_\_\_\_\_

\_\_\_\_\_

EMBANKMENT - Not Applicable

Name of Dam PAGE'S LAKE DAM  
 NDI # PA 00062

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM		

ANY NOTICEABLE SEEPAGE

STAFF GAGE AND RECORDER

DRAINS

## OUTLET WORKS

Name of Dam: PAGE'S LAKE DAM  
NDI # PA 00062

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None observed	
INTAKE STRUCTURE	Good condition	
OUTLET STRUCTURE	Good condition	
OUTLET CHANNEL	Good condition	
EMERGENCY GATE	The stop logs had been removed prior to the inspection. The stop logs are removed approximately one month each year to allow for boat dock repair.	

## UNGATED SPILLWAY

Name of Dam: PAGE'S LAKE DAMNDI # PA 00062

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

CONCRETE WEIR	Good condition	
---------------	----------------	--

APPROACH CHANNEL	Good condition	
------------------	----------------	--

DISCHARGE CHANNEL	Good condition. The right spillway training wall has cracks and spalling on the downstream face.	This is not considered significant enough to require repair at this time.
-------------------	--	---

BRIDGE AND PIERS	No problems observed for pedestrian foot bridge and piers.	
------------------	--	--

GATED SPILLWAY - Not Applicable

Name of Dam: PAGE'S LAKE DAM  
NDI # PA 00062

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
------------------------------	---------------------	-----------------------------------

CONCRETE SILL

APPROACH CHANNEL

DISCHARGE CHANNEL

BRIDGE AND PIERS

GATES AND OPERATION  
EQUIPMENT



INSTRUMENTATION

Name of Dam: PAGE'S LAKE DAM

NDI # PA 00062

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None observed	
OBSERVATION WELLS	None observed	
WEIRS	None observed	
PIEZOMETERS	None observed	
OTHER		

## RESERVOIR

Name of Dam: PAGE'S LAKE DAM  
 NDI # PA 00062

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The reservoir slopes are gentle on the left side and moderate on the right side. No signs of instability were observed. The majority of the shoreline has been developed with recreational cottages.	
SEDIMENTATION	The average reservoir depth is 10 ft. There is no indication that sedimentation is a significant problem.	
UPSTREAM DAM	Fuller's Lake Dam (NDI # PA 00073, PennDER # 58-121) is located upstream. A Phase I Inspection Report is currently being prepared by Michael Baker, Jr., Inc.	

## DOWNSTREAM CHANNEL

Name of Dam: PAGE'S LAKE DAM

NDI # PA 00062

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Some vegetation and debris is located in the downstream channel.	Remove debris and obstructive vegetation.

## SLOPES

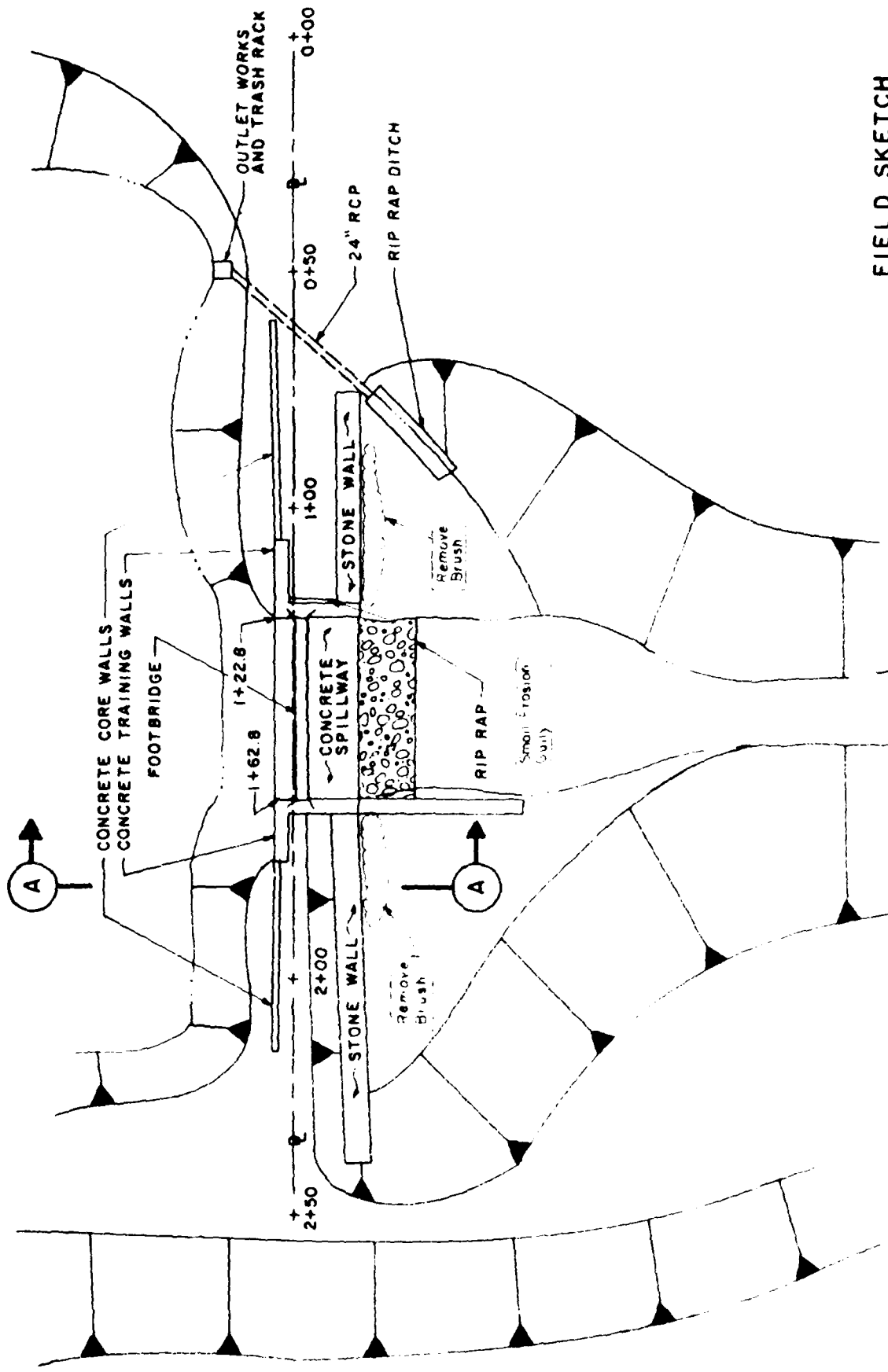
The downstream channel is moderately sloped.

APPROXIMATE NO.  
OF HOMES AND  
POPULATION

There is one township road approximately 800 ft.  
downstream. PA Route 492 is approximately  
1300 ft. downstream. There are one home and  
several (3) barns and garages which may be  
damaged in the event of failure of the dam.

## DOWNSTREAM DAM

Purdy (Stump Pond) Dam (NDI # PA 00063, PennDER  
# 58-11) is located downstream. A Phase I  
Inspection Report is currently being prepared  
by Michael Baker, Jr., Inc.



FIELD SKETCH

PAGE'S LAKE DAM  
 NDI NO. PA00062  
 PERMID NO. 58-5  
 SCHEMATIC - NOT TO SCALE

SECTION "A" TAKEN AT STA. 1+80

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Beaver, Pa. 15009

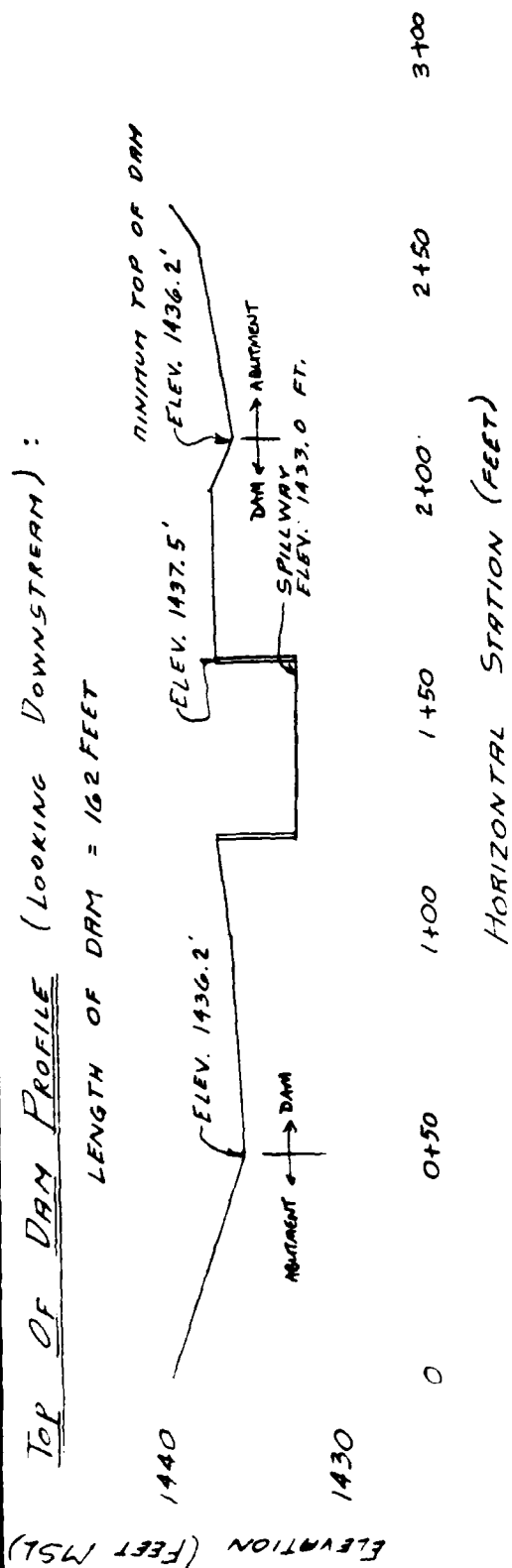
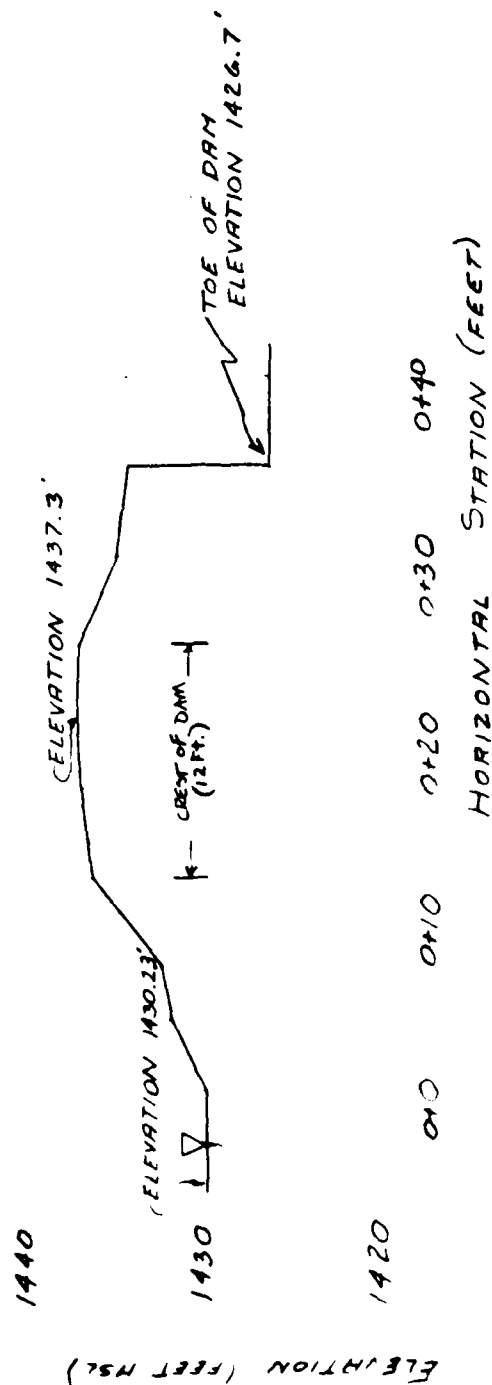
## PAGE'S LAKE DAM

TOP OF DAM PROFILE  
TYPICAL CROSS-SECTION

DATE OF INSPECTION: 27 October 1980

TOP OF DAM PROFILE (LOOKING DOWNSTREAM):

LENGTH OF DAM = 162 FEET

TYPICAL CROSS SECTION AT STA. 1+80

APPENDIX B

ENGINEERING DATA CHECK LIST

CHECK LIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION

Name of Dam: PAGE'S LAKE DAM  
NDI # PA 00062

ITEM	REMARKS
PLAN OF DAM	See Plate 4 of this report.
REGIONAL VICINITY MAP	A USGS 7.5 minute topographic quadrangle, Harford, Pennsylvania, was used to prepare the vicinity map which is enclosed in this report as Location Plan (Plate 1).
CONSTRUCTION HISTORY	No construction history is known other than the dam was constructed in 1863.
TYPICAL SECTIONS OF DAM	No information available
HYDROLOGIC/HYDRAULIC DATA	No information available
OUTLETS - PLAN	See Plate 4
- DETAILS	See Plate 4
- CONSTRAINTS	No information available
- DISCHARGE RATINGS	No information available
RAINFALL/RESERVOIR RECORDS	None available

Name of Dam: PAGE'S LAKE DAM

NDI # PA 00062

ITEM	REMARKS
DESIGN REPORTS	No information available
GEOLOGY REPORTS	No information available. The Regional Geology is presented as Appendix F of this report.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	No information available
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	No information available
POST-CONSTRUCTION SURVEYS OF DAM	None
BORROW SOURCES	No information available



Name of Dam: PAGE'S LAKE DAM

NDI # PA 00062

B-3

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	The dam was reconstructed in 1922. The spillway was replaced in 1972 and the drawdown structure was constructed in 1975.
HIGH POOL RECORDS	No information available
POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS	No detailed engineering reports other than the August 16, 1913 Water Supply Commission Inspection are available. A number of inspection reports are available in the PennDER File, including the latest recorded inspection on August 17, 1965 by PennDER.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	The only known accident at the dam was on March 23, 1913 when the attendant for the New Milford Light and Power Company failed to remove the flashboards in the spillway and the dam was overtopped and partially breached. The provisions for flashboards have been removed and flashboards should not be used in the future.
MAINTENANCE OPERATION RECORDS	No formal maintenance records are maintained.

Name of Dam: PAGE'S LAKE DAM  
NDI # PA 00062

B-4

ITEM	REMARKS
SPILLWAY PLAN,	See Plate 4
SECTIONS, and DETAILS	None available
OPERATING EQUIPMENT PLANS & DETAILS	No information available

CHECK LIST  
HYDROLOGIC AND HYDRAULIC DATA  
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 4.78 sq.mi., primarily wooded with  
mild to steep slopes

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1433.0 ft. M.S.L.  
(970 ac.-ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1436.2 ft. M.S.L.  
(1430 ac.-ft.)

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: 1436.2 ft. M.S.L. (minimum top of dam)

SPILLWAY: Rectangular channel

- a. Crest Elevation 1433.0 ft. M.S.L.
- b. Type Rectangular channel (concrete)
- c. Width of Crest Parallel to Flow 17 ft.
- d. Length of Crest Perpendicular to Flow 40 ft.
- e. Location Spillover Center of dam
- f. Number and Type of Gates None

OUTLET WORKS: Concrete box intake with stop logs and trash rack -  
a. Type discharge into 24 in. concrete pipe  
b. Location Left abutment  
c. Entrance Inverts 1428.69 ft. M.S.L.  
d. Exit Inverts 1428.01 ft. M.S.L.  
e. Emergency Drawdown Facilities The outlet works are the  
only drawdown facilities

HYDROMETEOROLOGICAL GAGES: None

- a. Type \_\_\_\_\_
- b. Location \_\_\_\_\_
- c. Records \_\_\_\_\_

MAXIMUM NON-DAMAGING DISCHARGE Unknown

APPENDIX C

PHOTOGRAPH LOCATION PLAN AND PHOTOGRAPHS

## DETAILED PHOTOGRAPH DESCRIPTIONS

### Overall View of Dam

Top Photo - Overall View of Upstream Face of Dam from  
(OV-T) Left Abutment

Bottom Photo - Overall View of Downstream Face of Dam  
(OV-B) from Right Abutment

### Photograph Location Plan

Photo 1 - View of Spillway Entrance

Photo 2 - Close-up of Spillway Crest

Photo 3 - View of Downstream Side of Spillway

Photo 4 - Oblique View of Downstream Side of Spillway and  
Dam from Left Abutment

Photo 5 - View of Intake for Outlet Conduit

Photo 6 - Close-up View of Intake for Outlet Conduit

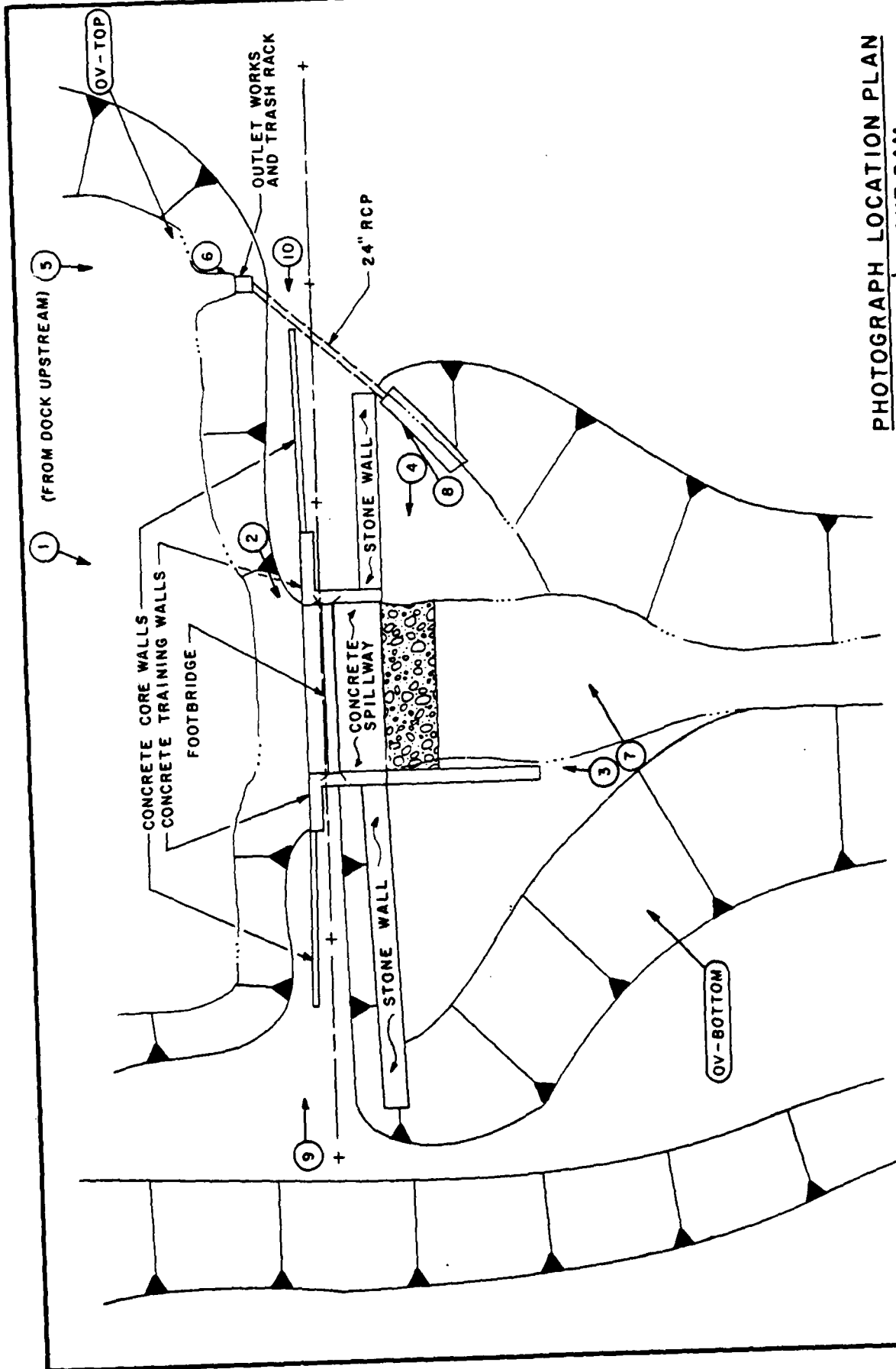
Photo 7 - View of Discharge Channel of Outlet Conduit

Photo 8 - Close-up View of Downstream End of Outlet Conduit

Photo 9 - View Along Axis of Dam from Right Abutment

Photo 10 - View of Crest of Dam from Left Abutment

Note: Photographs were taken on 27 October 1980.



**PHOTOGRAPH LOCATION PLAN**

PAGE'S LAKE DAM  
 NDI NO. PA00062  
 PENN. NO. 58-5  
 Photographs Taken 27 October 1980



## PAGE'S LAKE DAM



PHOTO 1. View of Spillway Entrance



PHOTO 2. Close-up of Spillway Crest

## PAGE'S LAKE DAM

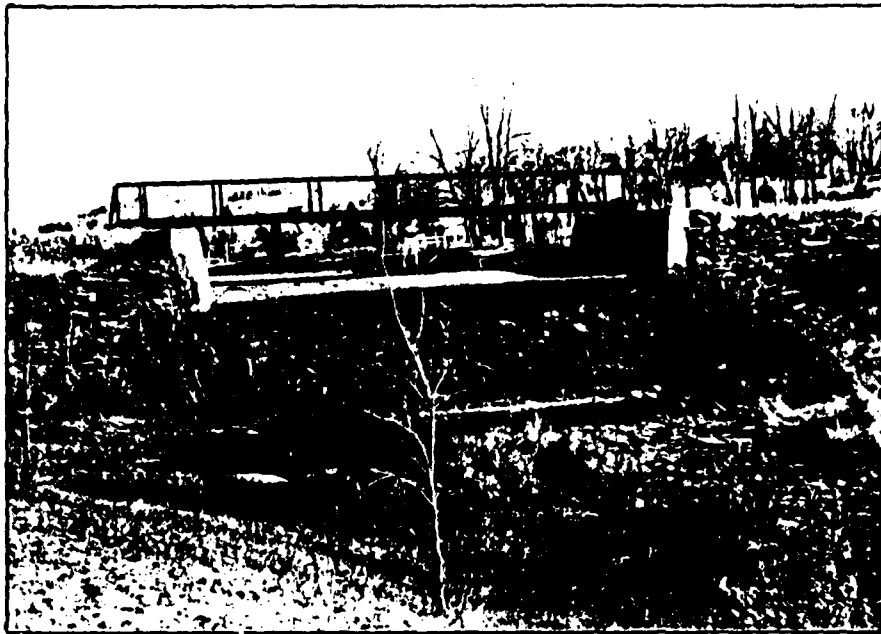


PHOTO 3. View of Downstream Side of Spillway

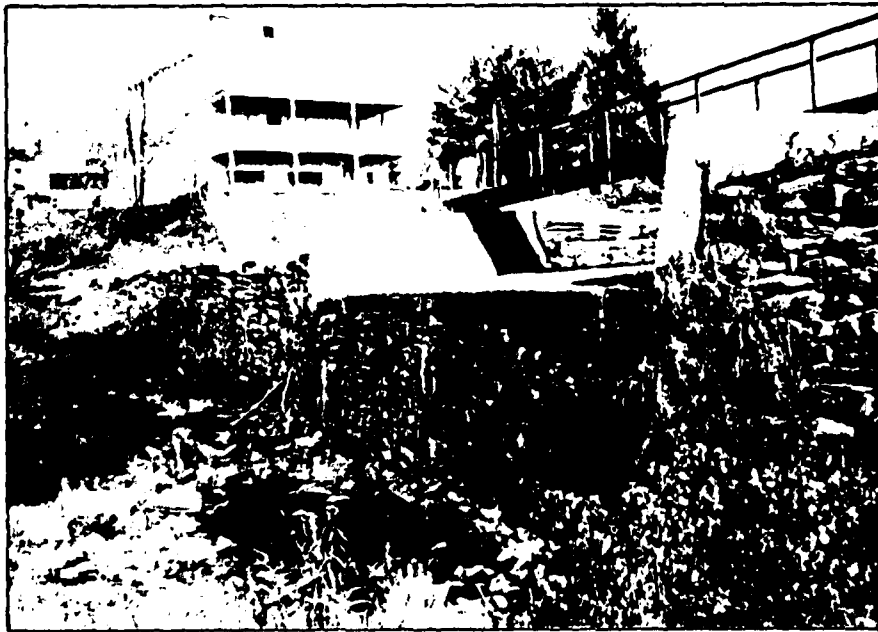


PHOTO 4. Oblique View of Downstream Side of Spillway and Dam from Left Abutment



# PAGE'S LAKE DAM



PHOTO 5. View of Intake for Outlet Conduit



PHOTO 6. Close-up View of Intake for Outlet Conduit

PAGE'S LAKE DAM



PHOTO 7. View of Discharge Channel of Outlet Conduit



PHOTO 8. Close-up View of Downstream End of Outlet Conduit

# PAGE'S LAKE DAM



PHOTO 9. View Along Axis of Dam from Right Abutment



PHOTO 10 View of Crest of Dam from Left Abutment

APPENDIX C

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

PROJECT NAME, JOB NO.  
PROJECT LOCATION

SUBJECT <sup>1</sup> PAGE'S LAKE DAM

S.C. No. \_\_\_\_\_

APPENDIX E - HYDROLOGIC AND

Sheet No. \_\_\_\_\_ of \_\_\_\_\_

HYDRAULIC COMPUTATIONS

Drawing No. \_\_\_\_\_

Designed by \_\_\_\_\_

Checked by \_\_\_\_\_

Date \_\_\_\_\_

<u>SUBJECT</u>	<u>PAGE</u>
PREFACE	i
HYDROLOGY AND HYDRAULIC DATA BASE	1
HYDRAULIC DATA	2
DRAINAGE AREA AND CENTROID MAP	3
TOP OF DAM PROFILE AND CROSS SECTION	4
SPILLWAY DISCHARGE RATING	5
SPILLWAY CAPACITY	6
ROUTING SUMMARY	7
HES - 1 SPILLWAY ANALYSIS	8

## PREFACE

### HYDROLOGIC AND HYDRAULIC COMPUTATIONS

The hydrologic determinations presented in this Phase I Inspection Report are based on the use of a Snyder's unit hydrograph developed by the U.S. Army Corps of Engineers. Due to the limited number of gaging stations available in this hydrologic region and the wide variations of watershed slopes, the Snyder's coefficients may yield results of limited accuracy for this watershed. As directed however, a further refinement of these coefficients is beyond the scope of this Phase I Investigation.

In addition, the conclusions presented pertain to present conditions, and the effect of future development on the hydrology has not been considered.

# HYDROLOGY AND HYDRAULIC ANALYSIS DATA BASE

NAME OF DAM: PAGE'S LAKE DAM

PROBABLE MAXIMUM PRECIPITATION (PMF) = 21.0 INCHES/24 HOURS<sup>(1)</sup>

STATION	1	2	3	4	5
Station Description	FULLER'S LAKE DAM	PAGE'S LAKE DAM			
Drainage Area (square miles)	0.95	3.83			
Cumulative Drainage Area (square miles)	0.95	4.78			
Adjustment of PMF for Drainage Area (%) <sup>(2)</sup>	ZONE 1	ZONE 1			
6 Hours	111	111			
12 Hours	123	123			
24 Hours	133	133			
48 Hours	142	142			
72 Hours	---	---			
Snyder Hydrograph Parameters					
Zone (3)	11A	11A			
$C_p/C_t$ (4)	0.62/1.50	0.62/1.50			
L (miles) (5)	1.48	3.41			
$L_{ca}$ (miles) (5)	0.61	1.48			
$t_p = C_t (L \cdot L_{ca})^{0.3}$ (hours)	1.45	2.44			
Spillway Data					
Crest Length (ft)	TRAPEZOIDAL SPILLWAY	SPILLWAY RATING			
Freeboard (ft)	RATING CURVE FROM	CURVE DEVELOPED			
Discharge Coefficient	FULLER'S LAKE DAM	ON SHEET 5			
Impoundment	INSPECTION REPORT				

(1) Hydro-meteorological Report 32 (Figure 1), U.S. Army, Corps of Engineers, 1956.

(2) Hydro-meteorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.

(3) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients ( $C_p$  and  $C_t$ ).

(4) Snyder's Coefficients.

(5) L = Length of longest water course from outlet to basin divide.

$L_{ca}$  = Length of water course from outlet to point opposite the centroid of drainage area.

MICHAEL BAKER, JR., INC.

THE BAKER ENGINEERS

Box 280  
Beaver, Pa. 15009Subject PAFFS LAKE DAM

S.O. No. \_\_\_\_\_

HYDROLOGIC DATASheet No. 2 of 18

Drawing No. \_\_\_\_\_

Computed by GUIT Checked by WLL Date 12-3-82STORAGE CALCULATIONSAREA VS. ELEVATION DATA : (MEASURED FROM QUADS)

<u>ELEVATION (FT.)</u>	<u>SURFACE AREA (ACRES)</u>
1433	102.85
1440	175.39
1460	273.65

NORMAL POOL STORAGE

$$\text{STORAGE VOLUME} = V_{NP} = \frac{1}{3} (A_1 + A_2 + \sqrt{A_1 A_2})$$

 $h$  = ESTIMATED FROM FIELD NOTES = 9.7 FT. $A_1$  = SURFACE AREA OF NORMAL POOL = 102.85 AC. $A_2$  = SURFACE AREA OF RESERVOIR BOTTOM = 97.41 AC.  
(ESTIMATED FROM AVERAGE DEPTH AND  
RESERVOIR SIDE SLOPES)

$$\text{NORMAL POOL STORAGE} = V_{NP} = \frac{9.7}{3} (102.85 + 97.41 + \sqrt{(102.85 \times 97.41)})$$

$$V_{NP} = 971.14 \text{ AC.-FT.}$$

TOP OF DAM STORAGE

1431 AC.-FT (FROM HEC-1 ANALYSIS)

SNYDER'S UNIT HYDROGRAPH PARAMETERS

$$L = 3.41 \text{ MI.}, L_{CP} = 1.48 \text{ MI.}$$

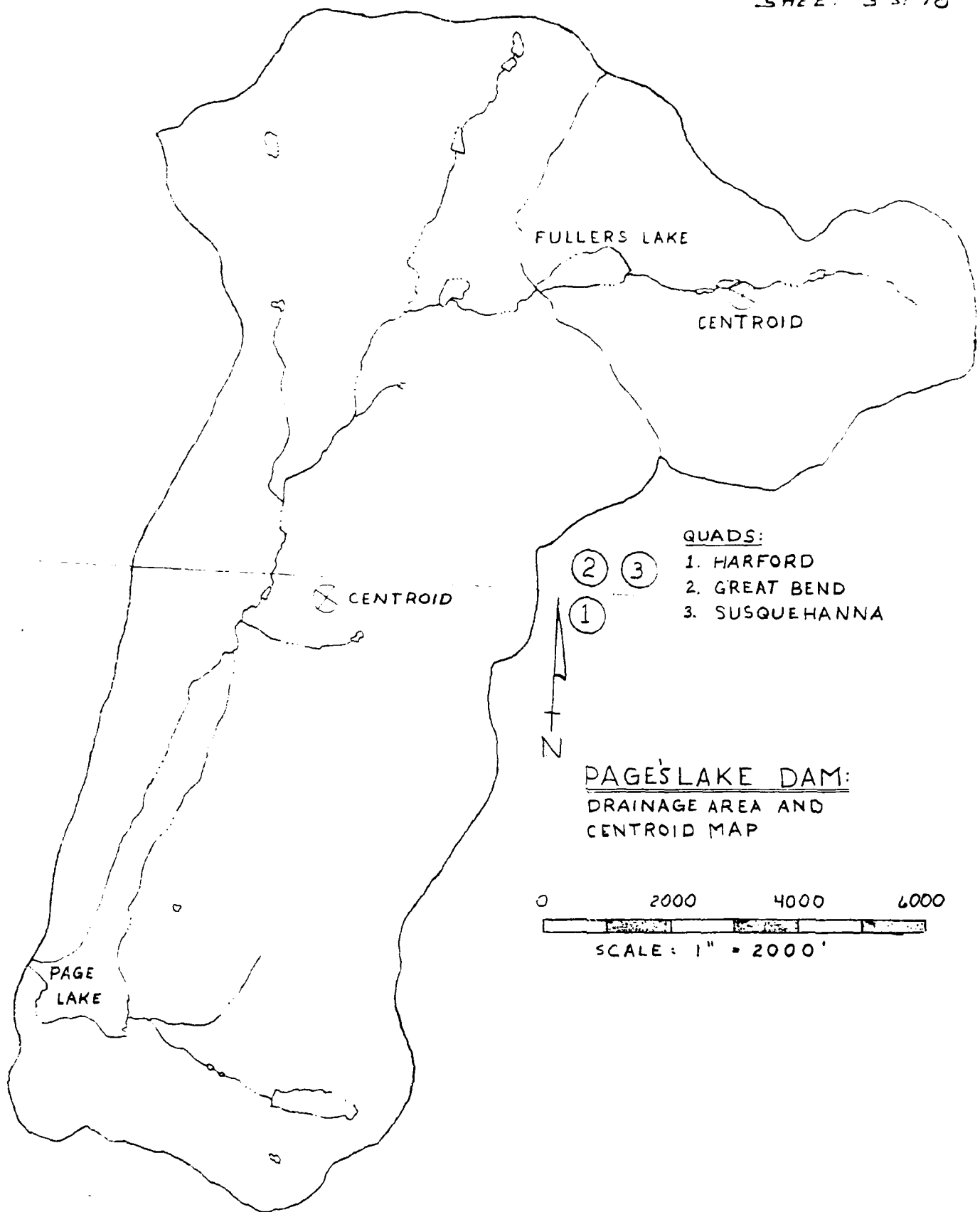
WATERSHED IS IN ZONE II A

$$C_p = \text{PLATE E} \quad C_p = 0.62$$

$$T_p = 1.50 (L/L_{CP})^{0.3} = 2.44$$

$$\text{DRAINAGE AREA ABOVE DAM} = 4.78 \text{ SQ MI.}$$





QUADS:

1. HARFORD
2. GREAT BEND
3. SUSQUEHANNA

PAGE'S LAKE DAM:  
DRAINAGE AREA AND  
CENTROID MAP

0 2000 4000 6000

SCALE: 1" = 2000'

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Subject PAGE'S LAKE DAM

S.O. No. 13837-00-APP-01

TOP OF DAM PROFILE

Sheet No. 4 of 18

TYPICAL CROSS SECTION

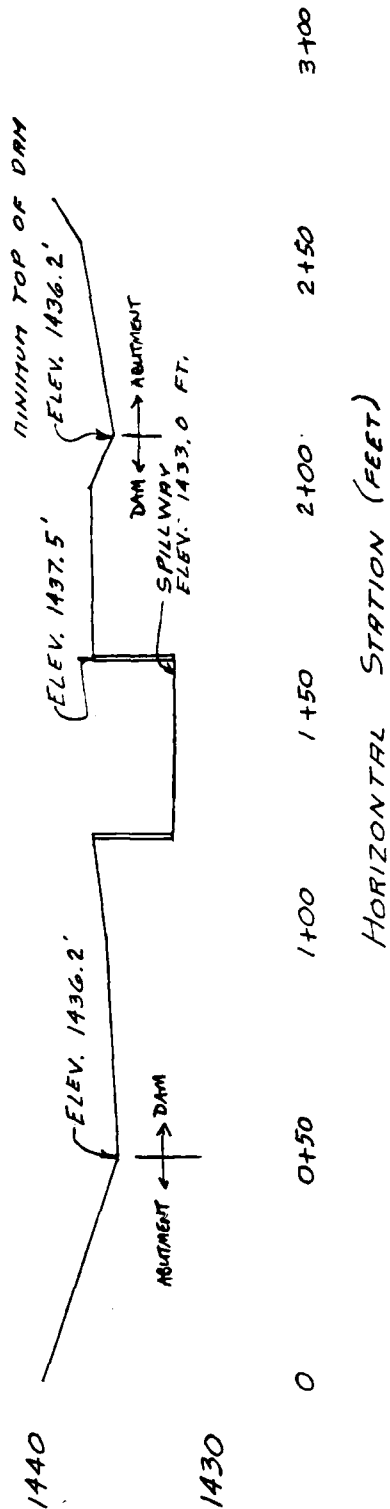
Drawing No. \_\_\_\_\_

Computed by GWT Checked by WDL

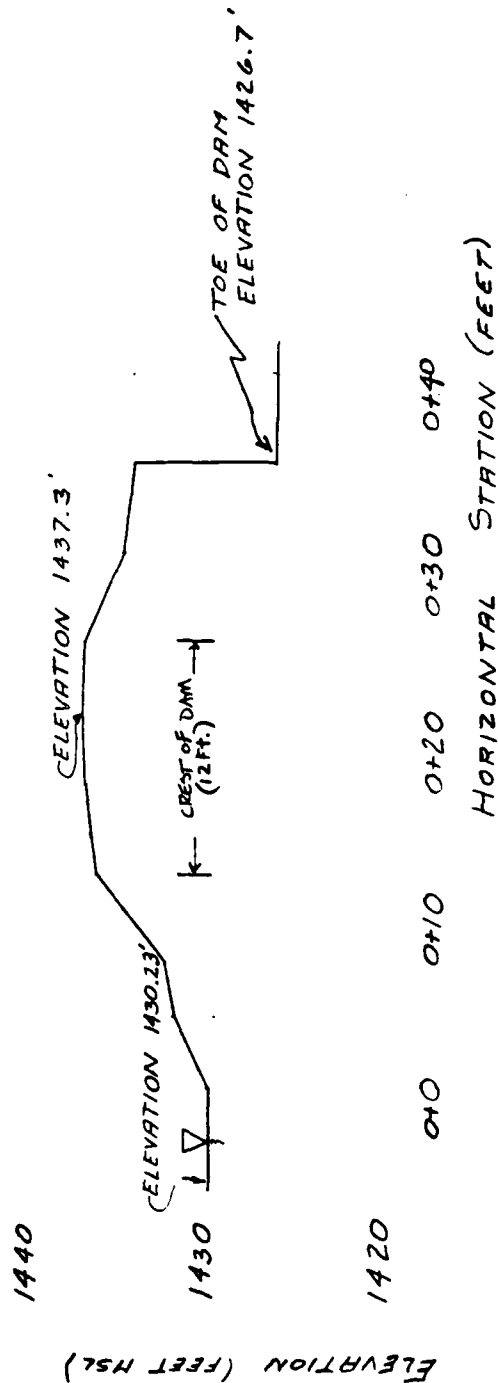
Date 11/14/80

TOP OF DAM PROFILE (LOOKING DOWNSTREAM):

LENGTH OF DAM = 162 FEET



TYPICAL CROSS SECTION AT STA. 1+80

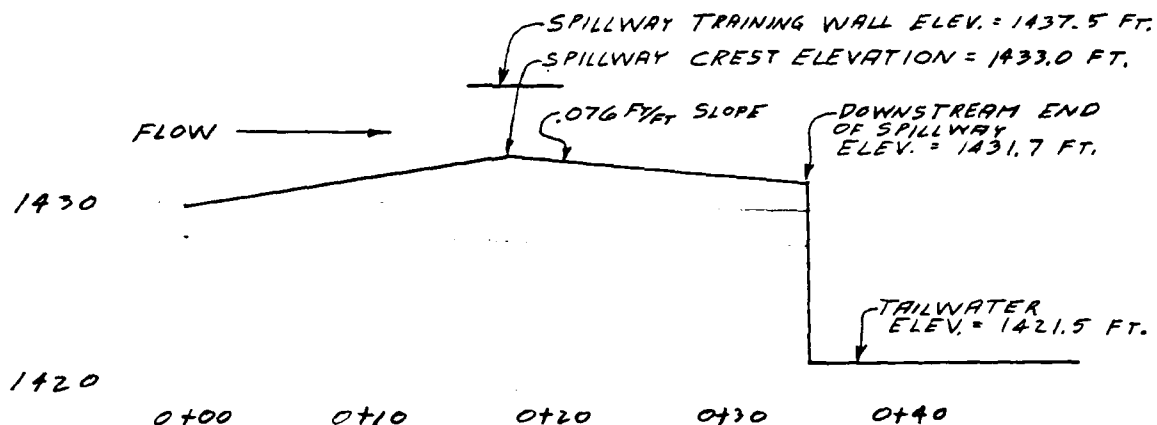


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Subject PAGE'S LAKE DAM S.O. No. 13037-00-ARA-01  
SPILLWAY DISCHARGE RATING Sheet No. 5 of 18  
Drawing No. \_\_\_\_\_  
Computed by GWT Checked by WDL Date 11-20-80

### SPILLWAY PROFILE



SPILLWAY SLOPE IS GREATER THAN CRITICAL SLOPE

DEVELOP RATING CURVE BASED ON CRITICAL FLOW OVER SPILLWAY:

$$V = \sqrt{gD} \quad (\text{CHOW, OPEN CHANNEL HYDRAULICS, P. 43})$$

$$g = 32.2 \text{ FT/SEC}^2$$

$$D = \text{MEAN HYDRAULIC DEPTH} = \frac{\text{FLOW AREA}}{\text{FREE SURFACE TOPOGRAPHY}} = \frac{A}{T}$$

$$V = \text{MEAN FLOW VELOCITY}$$

$$Q = VA$$

SPILLWAY ELEVATION, FT.	FLOW DEPTH, FT.	AREA, FT <sup>2</sup>	TOP WIDTH, FT.	A/T	V, FT/SEC.	Q, CFS	V <sup>2</sup> /2g	RESERVOIR SURFACE, FT.
1433.0	0	0	0	0	0	0	0	1433.0
1433.5	0.5	20.0	40	0.5	4.01	80.20	0.25	1433.75
1434.0	1.0	40.0	40	1.0	5.67	226.80	0.50	1434.50
1434.5	1.5	60.0	40	1.5	6.95	417.00	0.75	1435.25
1435.0	2.0	80.0	40	2.0	8.02	641.60	1.00	1436.00
1436.0	3.0	120.0	40	3.0	9.83	1176.60	1.50	1437.50
1436.5	3.5	140.0	40	3.5	10.62	1486.80	1.75	1438.25
1437.0	4.0	160.0	40	4.0	11.35	1816.00	2.00	1439.00
1437.5	4.5	180.0	40	4.5	12.04	2167.20	2.25	1439.75
1438.0	5.0	200.0	40	5.0	12.69	2538.00	2.50	1440.50
1438.5	5.5	220.0	40	5.5	13.31	2928.20	2.75	1441.25

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Subject PAGE'S LAKE DAM

S.O. No. \_\_\_\_\_

SPILLWAY CAPACITY

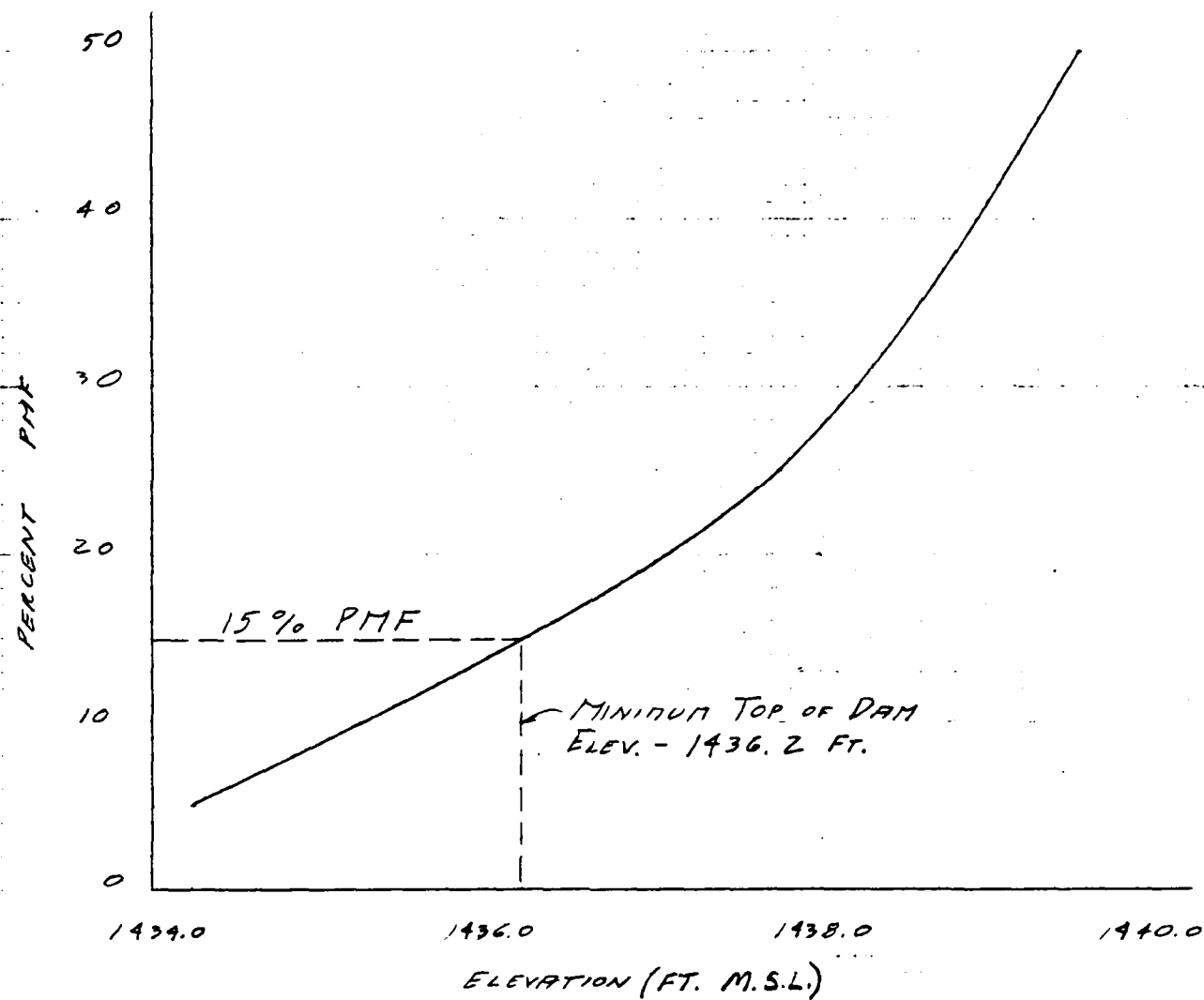
Sheet No. 6 of 18

Drawing No. \_\_\_\_\_

Computed by GWT

Checked by \_\_\_\_\_

Date 1-27-81



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Subject PAGES LAKE DAM

ROUTING SUMMARY

S.O. No. \_\_\_\_\_

Sheet No. 7 of 18

Drawing No. \_\_\_\_\_

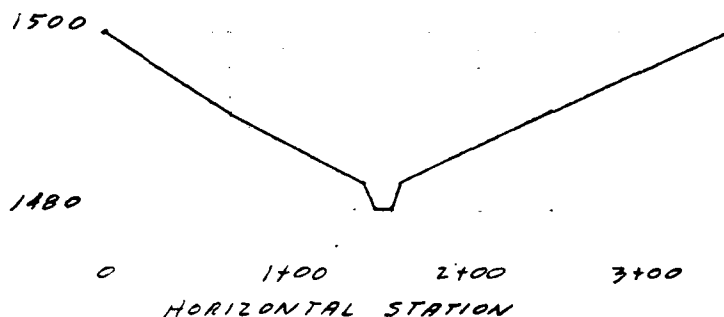
Computed by GWT Checked by \_\_\_\_\_

Date 1-20-81

NAME	LENGTH OF DAM	HEIGHT OF DAM	NORMAL POOL STORAGE	TOP OF DAM STORAGE	ROUTING LENGTH OF CHANNEL
PAGE'S LAKE	162 FT.	15 FT	971.1 AC-FT AT 1433.0 FT	1431 AC-FT AT 1436.2 FT	
FULLER'S LAKE	143 FT.	9.0 FT.	60.7 AC-FT AT 1537.0 FT	89 AC-FT. AT 1539.6 FT	9300 FT.

TYPICAL ROUTING CHANNEL

FULLER'S LAKE TO PAGE'S LAKE



\*\*\*\*\*  
 FLOOD HYDROGRAPH PACKAGE (HUC-1)  
 DAI SAFETY VERSION JULY 1973  
 LAST MODIFICATION 26 FEB 79  
 M8J UPDATE 04 JUN 79  
 \*\*\*\*\*

1	A1	NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS									
2	A2	HYDRAULIC AND HYDRAULIC ANALYSIS OF PAGE LAKE DAM									
3	A3	UNIT HYDROGRAPH BY SCS METHOD									
4	B	0	10	0	0	0	0	0	0	-4	0
5	B1	5									
6	J	1	1								
7	J1	0.5	0.25	0.05							
8	K	0									
9	K1	RUNOFF HYDROGRAPH TO DAI									
10	M	1	1	0.95							
11	P	21	111	123	133	142	1.0	0.05			
12	T										
13	X	1.45	0.62	2.0							
14	X	-1.5	-0.05								
15	K	1	2								
16	K1	ROUTING FOR FULLERS LAKE DAM									
17	V	1	1								
18	V1	1									
19	V6	1517	1537.7	1538.3	1539	1539.6	1540.2	1540.3			
20	V5	J	29.6	100.3	225.7	370.8	635.8	674.1			
21	BA	13.88	16.33	25.71	38.57						
22	BE	1533	1537	1540	1560						
23	BS	1517									
24	BS1539.5	3.33	1.5	99							
25	SL	J	1.5	29	54	71	84	97			
26	SV1539.5	1517	1540.5	1541	1541.5	1542	1542.5	1543			
27	K	1	3								
28	K1	ROUTING THRU CHANNEL TO PAGE LAKE									
29	V	1	1								
30	V1	1									
31	V6	0.06	0.06	1433	1500	9300	0.01				
32	V7	J	1533	70	1491	144	1483	150	1480	153	1480
33	V7	153	1483	250	1491	350	1500				
34	K	2	6								
35	K1	ROUTING HYDROGRAPH TO PAGE LAKE									
36	M	1	1	3.83							
37	P	21	111	123	133	142	1.0	0.05			
38	T	2.45	0.82								
39	X	-1.5	-0.05	2.0							
40	K	2	5								
41	K1	CG LINE HYDROGRAPHS FROM STATIONS 3 AND 4									
42	K	1	6								
43	K1	ROUTING FOR PAGE LAKE DAM									
44	V	1	1								
45	V1	1									
46	V6	1433	1433.7	1434.5	1435.2	1436.0	1437.5	1438.2	1439.0	1439.7	1440.5
47	V5	J	80.2	226.8	417.0	641.6	1176.6	1406.6	1616.0	2167.2	2536.0
48	BA	97.01	132.45	175.39	273.65						
49	BE	1423.1	1433	1440	1460						
50	BS	1423.1	1433	1440	1460						

SHEET 9 OF 18

[illegible]





\*\*\*\*\*  
 FLJUD HYDROGRAPH PACKAGE (REV-1)  
 DAM SAFETY VERSION JULY 1978  
 LAST MODIFICATION 26 FEB 79  
 MOD UPDATE 04 JUN 79  
 \*\*\*\*\*

RUN DATE 02/17/81  
 TIME 15.15

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS  
 HYDROLOGIC AND HYDRAULIC ANALYSIS OF PAGE LAKE DAM  
 UNIT HYDROGRAPH BY SCS METHOD

JOB SPECIFICATION

NO	NR	NRN	TDAY	JHR	IMN	METC	IPLT	IPRT	NSTAN
400	0	10	0	0	0	0	0	-4	0
		JUPER	NMI	LROPI	TRACE				
		3	0	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED

NPLAN= 1 NR10= 3 LR10= 1

RTIUS= 0.50 0.25 0.05

SUB-AREA RUNOFF COMPUTATION

RJHUFF HYDROGRAPH TO DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	IRAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IJHG	TAREA	SNAP	TASDA	TRSPC	RATIO	ISNUM	ISAME	LUAL
1	1	0.95	0.0	0.95	0.0	0.0	0	0	0

PRECIP DATA

SPEE	PMS	R6	R12	R24	R48	R72	R96
0.0	21.00	111.00	123.00	133.00	142.00	0.0	0.0

TRSPC COMPUTED BY THE PROGRAM IS 0.000

LOSS DATA

LROPT	STAKR	DLTKR	RTIOL	ERAIN	STRKS	RTIUK	SIRKL	CNSTL	ALSHA	KIIMP
0	0.0	0.0	1.00	0.0	0.0	1.00	1.00	0.05	0.0	0.0

UNIT HYDROGRAPH DATA

TP= 1.45 CP=0.62 NIA= 0

RECESSION DATA

STRU= -1.50 QRCNS= -0.05 RTIUR= 2.00

UNIT HYDROGRAPH 49 END-OF-PERIOD URTHMATES, LAU= 1.45 HOURS, CP= 0.62 VOL= 1.00									
10.	37.	74.	116.	161.	206.	238.	259.	268.	260.
237.	237.	185.	164.	155.	126.	113.	100.	89.	78.
69.	51.	54.	48.	42.	38.	33.	29.	26.	23.
20.	13.	16.	14.	12.	11.	10.	9.	8.	7.

0 3. JA HR.MN PERIOD RAIN EXCS LUSS END-OF-PERIOD FLUM MU.DA HR.MN PERIOD RAIN EXCS LUSS LUMP W

SUN 23.86 21.47 2.39 79038.  
1 006.01 545.01 61.01 2238.110

\*\*\*\*\*

# HYDROGRAPH ROUTING

## ROUTING FOR FULLERS LAKE DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRI	INAME	ISTAGE	IAUTU
2	1	0	0	0	0	1	0	0

## ROUTING DATA

KLOSS	CLOSS	AVG	IRCS	ISAME	IUPT	IPMP	LSTR
0.0	0.0	0.0	1	1	0	0	0

ASTPS	NSIDL	LAG	AMSKK	X	ISK	SIURA	ISPRAI
1	0	0	0.0	0.0	0.0	-1537.	-1

STAGE	1537.00	1537.70	1538.30	1539.00	1539.60	1540.20	1540.30
FLUM	0.0	29.40	100.30	224.70	370.80	635.80	674.10

SURFACE AREA= 14. 17. 26. 39.

CAPACITY= 0. 61. 124. 762.

ELEVATION= 1533. 1537. 1540. 1560.

UREL	SPWID	COUM	EXPW	ELEVEL	COOL	CAREA	EXPL
1537.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## DAM DATA

TOPEL	CUQD	EXPD	DAMHID
1539.6	3.1	1.5	99.

GREST LENGTH	0.	16.	29.	45.	54.	71.	84.	97.
AT OR BELOW ELEVATION	1539.6	1540.0	1540.5	1541.0	1541.5	1542.0	1542.5	1543.0

PEAK OUTFLOW IS 1202. AT TIME 41.50 HOURS

PEAK OUTFLOW IS 573. AT TIME 41.67 HOURS

PEAK OUTFLOW IS 85. AT TIME 42.67 HOURS

\*\*\*\*\*

# HYDROGRAPH ROUTING

## ROUTING THRU CHANNEL TO PAGE LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRI	INAME	ISTAGE	IAUTU
3	1	0	0	0	0	1	0	0

NORMAL DEPTH CHANNEL ROUTING

```
CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.0 1500.00 70.00 1491.00 144.00 1483.00
159.00 1483.00 250.00 1491.00 350.00 1500.00
```

MAXIMUM STAGE IS	1486.1
MAXIMUM STAGE IS	1484.2
MAXIMUM STAGE IS	1482.3

SUB-AREA RUNOFF COMPUTATION

RJ4UFF HYDROGRAPH TO PAGE LAKE

PRECIP DATA					
SPFL	PMS	R6	R12	R24	R48
0. J	21.00	111.00	123.00	133.00	147.00

TRSPC COMPUTED BY THE PROGRAM L, 0.300

[illegible]

UNIT HYDROGRAPH AT END-OF-PERIOD ORIGINATES, LAG= 2.43 HOURS, CP= 0.02 VUM= 1.00  
 STRTQ= -1.50 CUSQ= -0.05 RTUR= 2.00

12.	41.	89.	142.	204.	250.	300.	350.	400.	450.	500.
572.	637.	636.	651.	655.	643.	610.	567.	527.	490.	450.
217.	222.	192.	364.	339.	314.	292.	271.	252.	236.	214.
106.	37.	188.	174.	162.	150.	140.	130.	121.	112.	104.
50.	46.	90.	83.	77.	72.	67.	62.	58.	54.	50.
24.	22.	43.	40.	37.	34.	32.	30.	28.	26.	24.
11.	10.	21.	19.	18.	16.	15.	14.	13.	12.	11.
5.	4.	8.	8.	8.	8.	7.	7.	6.	6.	5.

NO. JA HR. MN PERIOD MAIN EXCS LOSS CUMP C MU. DA HK. MN PERIOD MAIN EXCS LOSS CUMP W

SUM 23.86 21.47 2.39 3183.1.  
 1006.11 545.11 61.11 9013.861

\*\*\*\*\*

COMBINE HYDROGRAPHS

COMBINE HYDROGRAPHS FROM STATIONS 3 AND 4

ISTAQ 5 ICOMP 2 IELUN 0 ITAPE 0 JPLT 0 JPRY 0 INAME 1STAGE 1AUTU

\*\*\*\*\*

HYDROGRAPH ROUTING

ROUTING FOR PAGE LAKE DAM

ISTAQ 6 ICOMP 1 IELUN 0 ITAPE 0 JPLT 0 JPRY 0 INAME 1STAGE 1AUTU

JLOS, CLOSS AVG IRES ISAME IUPI 1PMP LSTR

0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

45IPS MSTOL LAG AMSKK X ISK STOMA 1SPRAI

1 0 0 0.0 0.0 0.0 -1833.

STAGE	1433.00	1433.70	1434.50	1435.20	1436.00	1437.50	1438.20	1439.00	1439.70	1440.50
FLUM	0.0	80.20	226.80	417.00	641.00	1176.00	1486.80	1816.00	2107.20	2538.00

SURFACE AREA= 97. 103. 175. 274.

CAPACITY= 0. 371. 1934. 6388.

ELEVATION= 1423. 1433. 1446. 1460.

CREL SPWID COWW EXPW ELEV COUL LAREA EXPL

1433.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

DAM DATA

TUPEL CUSQ EXPD UAMWID

1436.2 3.1 1.5 102.

CREST LENGTH  
AT OR BELOW  
ELEVATION

0.	50.	80.	125.	185.	197.	205.	213.
1436.2	1435.5	1437.0	1437.5	1438.0	1438.5	1439.0	1439.5

PEAK OUTFLOW IS 435% AT TIME 43.17 HOURS

PEAK OUTFLOW IS 164% AT TIME 46.17 HOURS

PEAK OUTFLOW IS 198% AT TIME 45.50 HOURS

.....

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)  
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

RATIOS APPLIED TO FLOWS

OPERATION	STATION	AREA	PLAN	RATIO 1	RATIO 2	RATIO 3
				0.50	0.25	0.05
HYDROGRAPH AT	1	3.92	1	1328.	664.	133.
	(	2.46)	(	37.60)	18.80)	3.76)
ROUTED TO	2	3.95	1	1202.	573.	85.
	(	2.46)	(	34.03)	16.22)	2.42)
ROUTED TO	3	3.92	1	1165.	552.	83.
	(	2.46)	(	32.58)	15.23)	2.34)
HYDROGRAPH AT	4	3.83	1	4125.	2063.	413.
	(	3.92)	(	116.82)	58.41)	11.68)
2 COMBINED	5	4.73	1	5290.	2611.	483.
	(	12.38)	(	149.79)	73.94)	13.68)
ROUTED TO	6	4.73	1	4354.	1649.	128.
	(	12.38)	(	123.30)	46.70)	5.59)

# SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 *Fence's Lake Dam*

ELEVATION		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM		
STORAGE		61.	1537.00	1539.60		
OUTFLOW		0.	0.	119.		
				371.		
RATIO OF PNE	MAXIMUM RESERVOIR ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC=FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS
0.50	1541.28	1.68	157.	1202.	5.83	41.50
0.25	1540.04	0.84	125.	573.	3.00	41.87
0.05	1538.17	0.0	82.	85.	0.0	42.61
PLAN 1 STATION 3						
RATIO	MAXIMUM FLUM, CFS	MAXIMUM STAGE, FT	TIME HOURS			
0.50	1165.	1486.1	42.00			
0.25	552.	1484.2	42.17			
0.05	83.	1482.3	43.33			

# SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 *Post-Lake Dam*

ELEVATION	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
STORAGE	1433.00	1433.00	1436.20
OUTFLOW	971.	971.	1348.
	0.	0.	113.

RATIO OF PPE	MAXIMUM RESERVOIR W.S. ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF	
						MAX OUTFLOW HOURS	FAILURE HOURS
0.50	1439.54	3.34	1854.	4354.	11.83	43.17	0.0
0.25	1437.74	1.54	1566.	1649.	8.17	48.17	0.0
0.05	1434.34	0.0	1117.	198.	0.0	45.50	0.0

SHEET 18 OF 18



APPENDIX E

PLATES

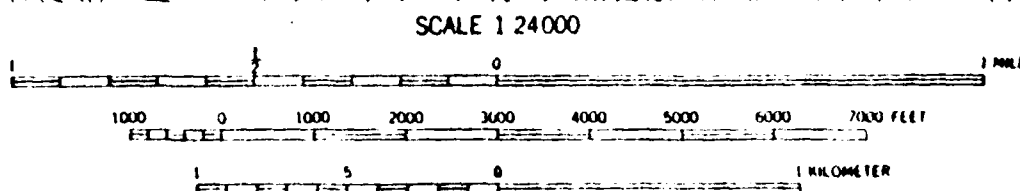
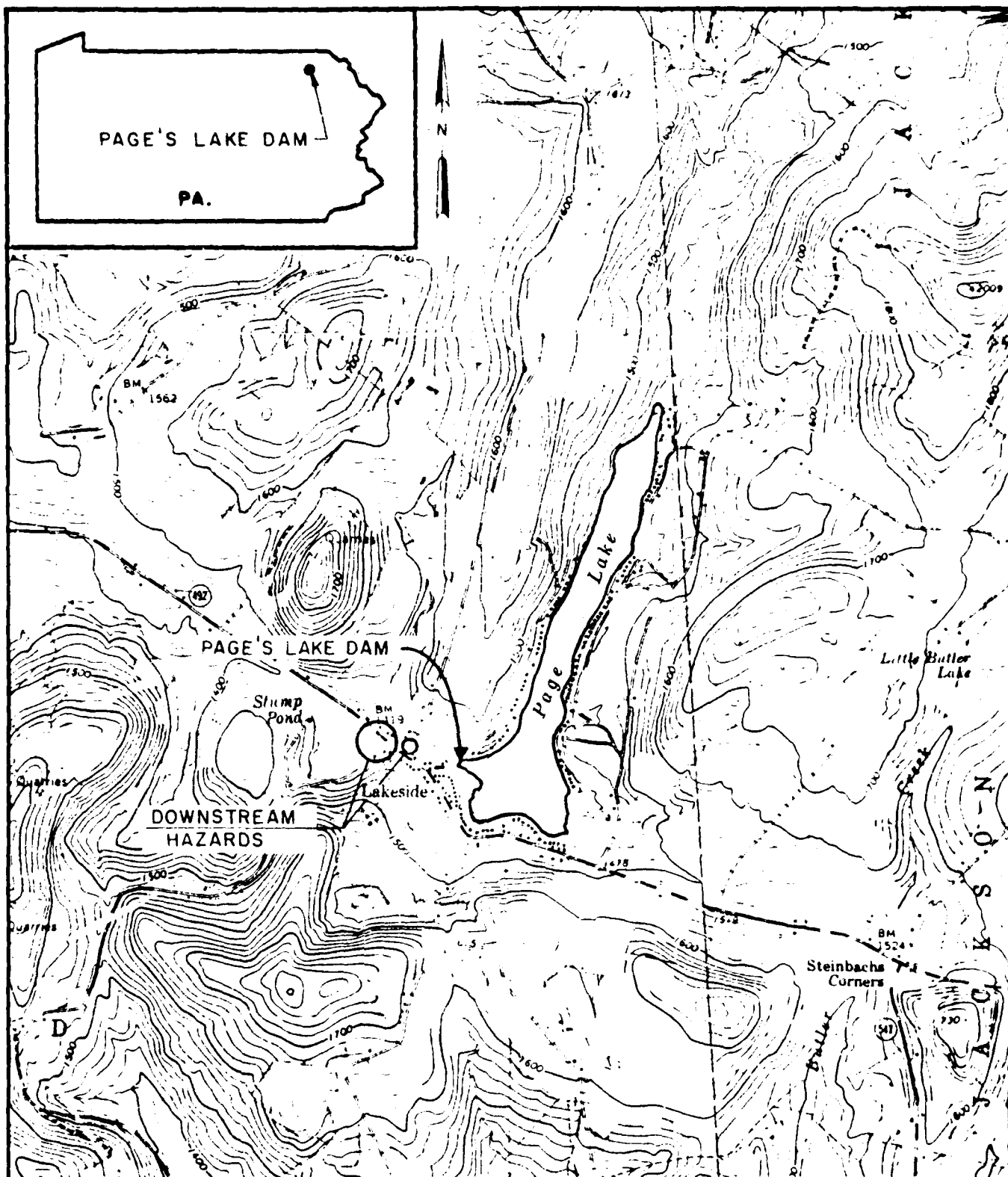
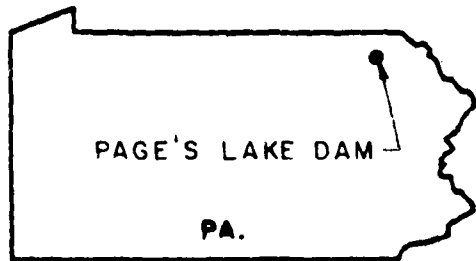
## CONTENTS

Plate 1 - Location Plan

Plate 2 - Watershed Map

Plate 3 - 1913 Drawing Showing Profile and Cross Section  
of Dam

Plate 4 - Drawdown Control Structure



REFERENCES:  
1. U.S.G.S. 7.5 HARFORD, PA.  
QUADRANGLE PHOTOREVISED 1978  
2. U.S.G.S. 7.5 GREAT BEND, PA.  
QUADRANGLE PHOTOREVISED 1978

PLATE 1 LOCATION PLAN  
PAGE'S LAKE DAM

PAGE'S LAKE DAM

PA.

N

APPROXIMATE  
WATERSHED AREA

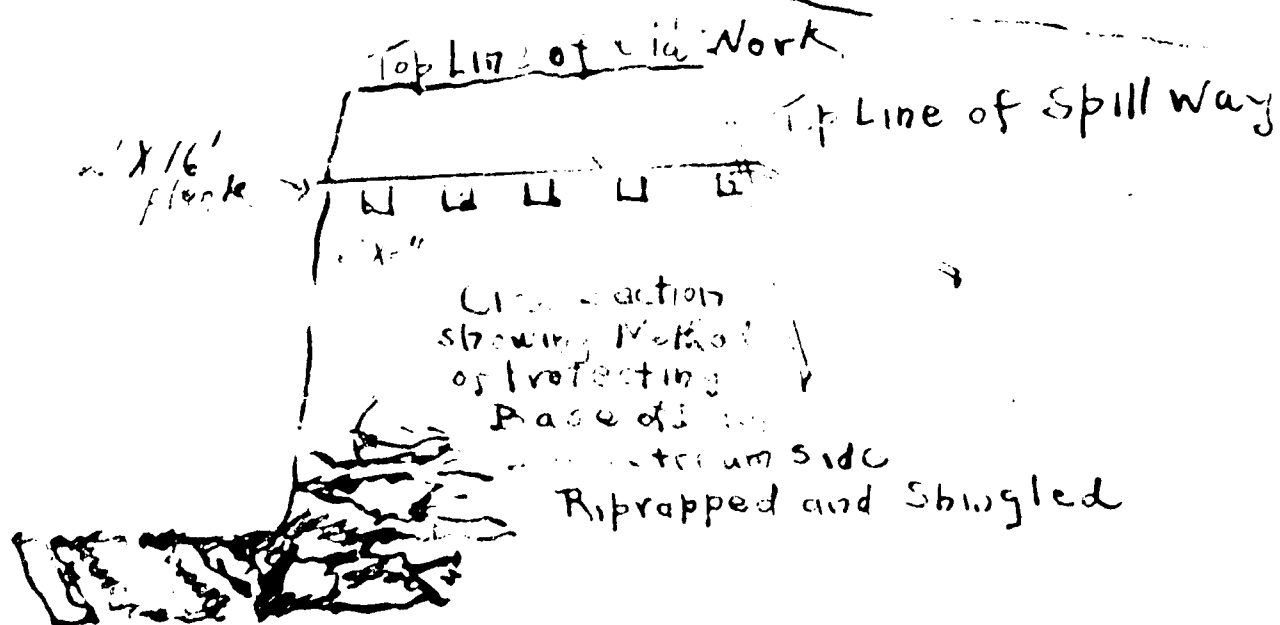
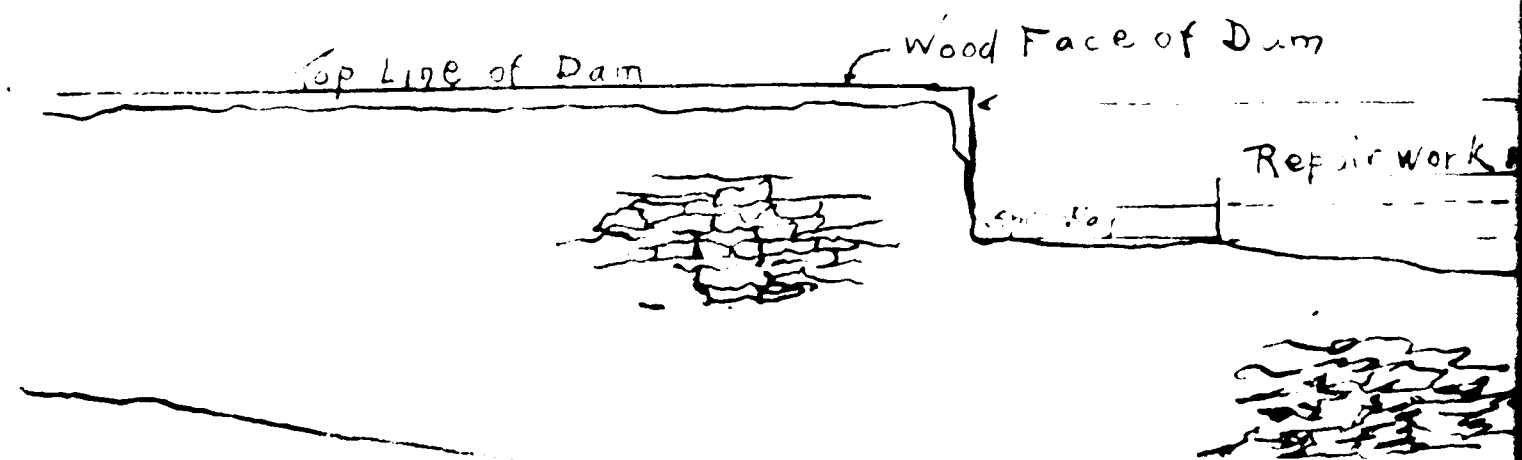
PAGE'S LAKE  
DAM

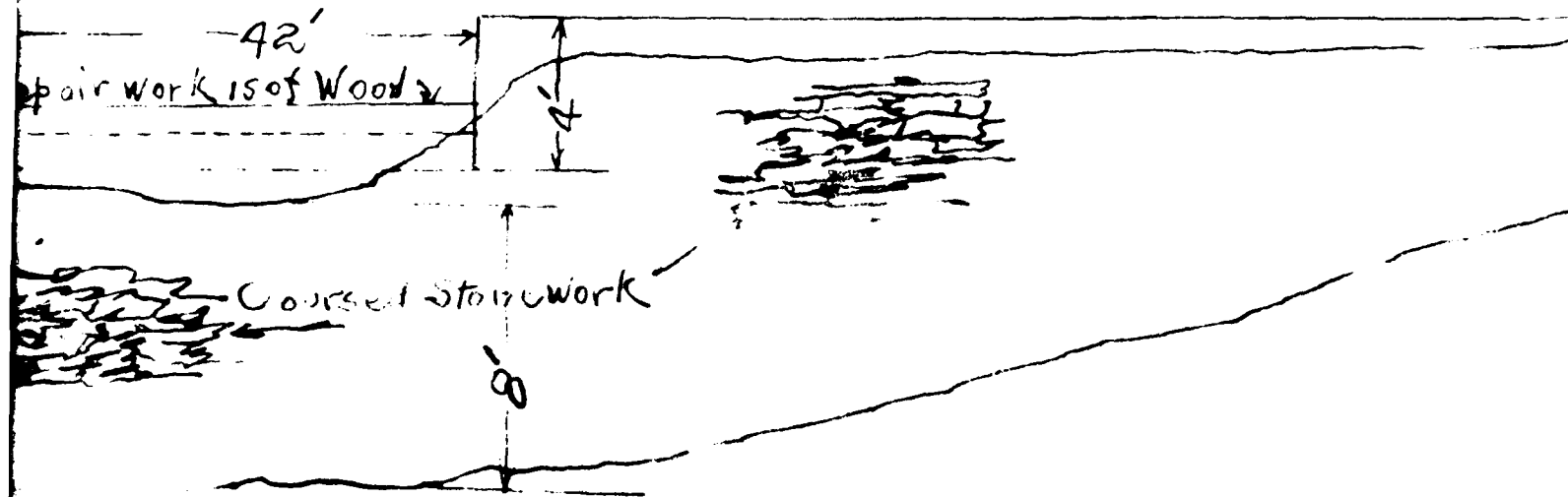
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REFERENCES:

1. USGS 75 SUSQUEHANNA, PA  
QUADRANGLE 1968
2. USGS 75 THOMPSON, PA  
QUADRANGLE PHOTOREVISED 1978
3. USGS 75 HARFORD, PA  
QUADRANGLE PHOTOREVISED 1978
4. USGS 75 GREAT BEND, PA  
QUADRANGLE PHOTOREVISED 1978

PLATE 2 WATERSHED MAP  
PAGE'S LAKE DAM



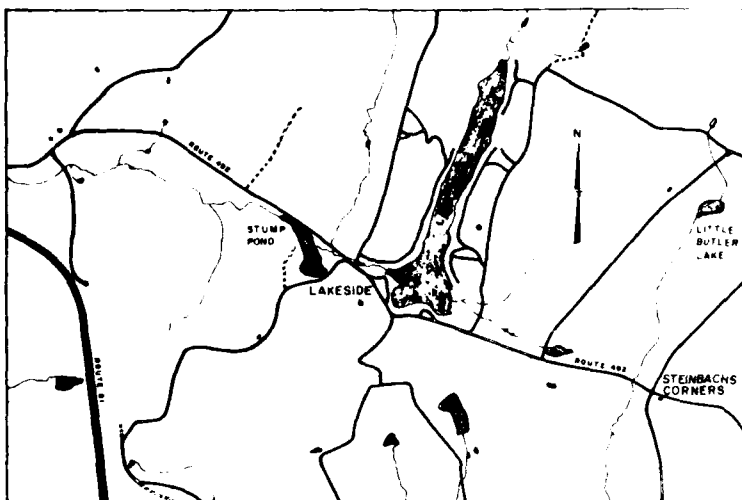


### PLATE-3

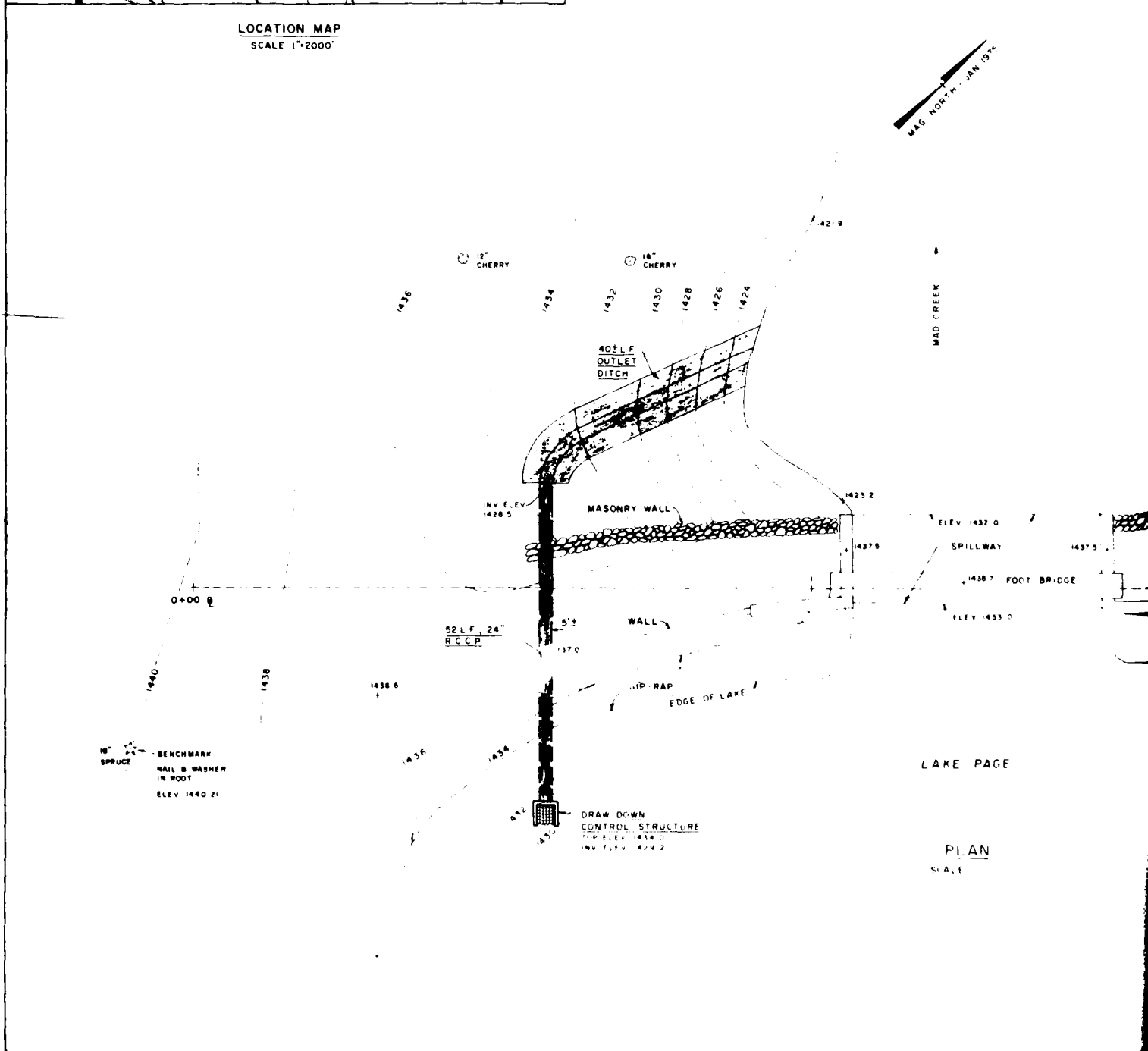
DAM at PAGES POND showing present condition  
and Proposed Crest of Dam.

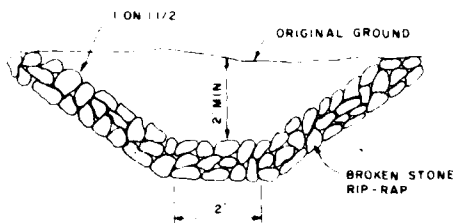
December 23rd 1913.

47-1

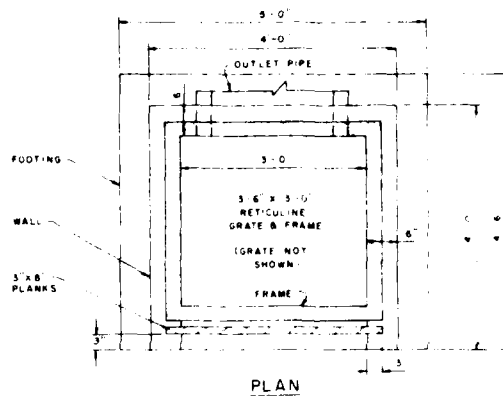


LOCATION MAP  
SCALE 1"=2000'

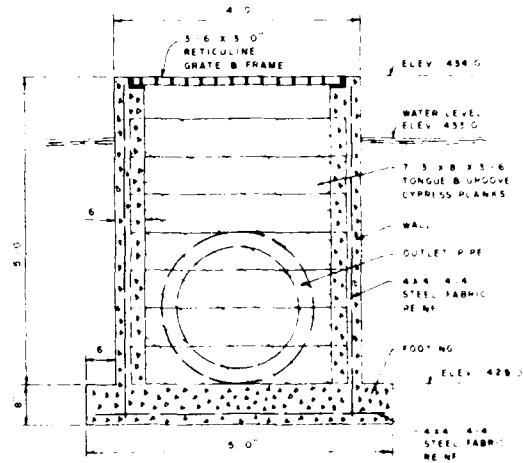




**OUTLET DITCH**  
SCALE 1/2" = 1'-0"

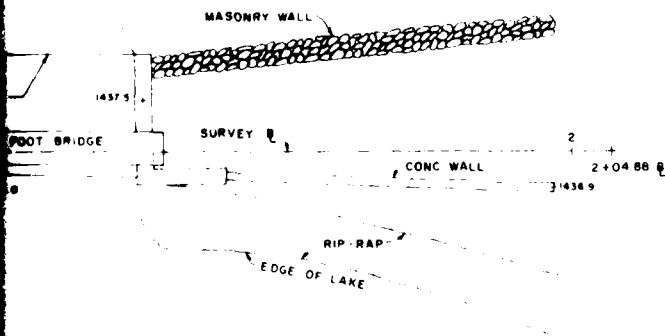


**PLAN**



**SECTION**

**PRE-CAST CONCRETE  
DRAW-DOWN CONTROL STRUCTURE**  
SCALE 3/4" = 1'-0"



**NOTES**

- 1 NAME & ADDRESS OF LAKE OWNER & OPERATOR  
LAKESIDE OUTING CLUB  
RD #2  
NEW MILFORD, PENN 18834
- 2 ELEVATIONS ARE REFERENCED TO U.S.G.S DATUM
- 3 ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF THE COMMONWEALTH OF PENNSYLVANIA, DEPARTMENT OF ENVIRONMENTAL RESOURCES
- 4 THE PIPE BACKFILL THROUGH THE DAM SHALL BE MADE WITH IMPERVIOUS MATERIAL AND SHALL BE THOROUGHLY COMPACTED SO AS TO BE IMPERVIOUS

**PLATE - 4**

**DRAW-DOWN CONTROL STRUCTURE**

**LAKE PAGE**

NEW MILFORD TOWNSHIP  
SUSQUEHANNA COUNTY  
PENNSYLVANIA

C.J. WINTERBERGER - CIVIL ENGR - SURVEYOR  
VESTAL, NY MAY 9, 1975



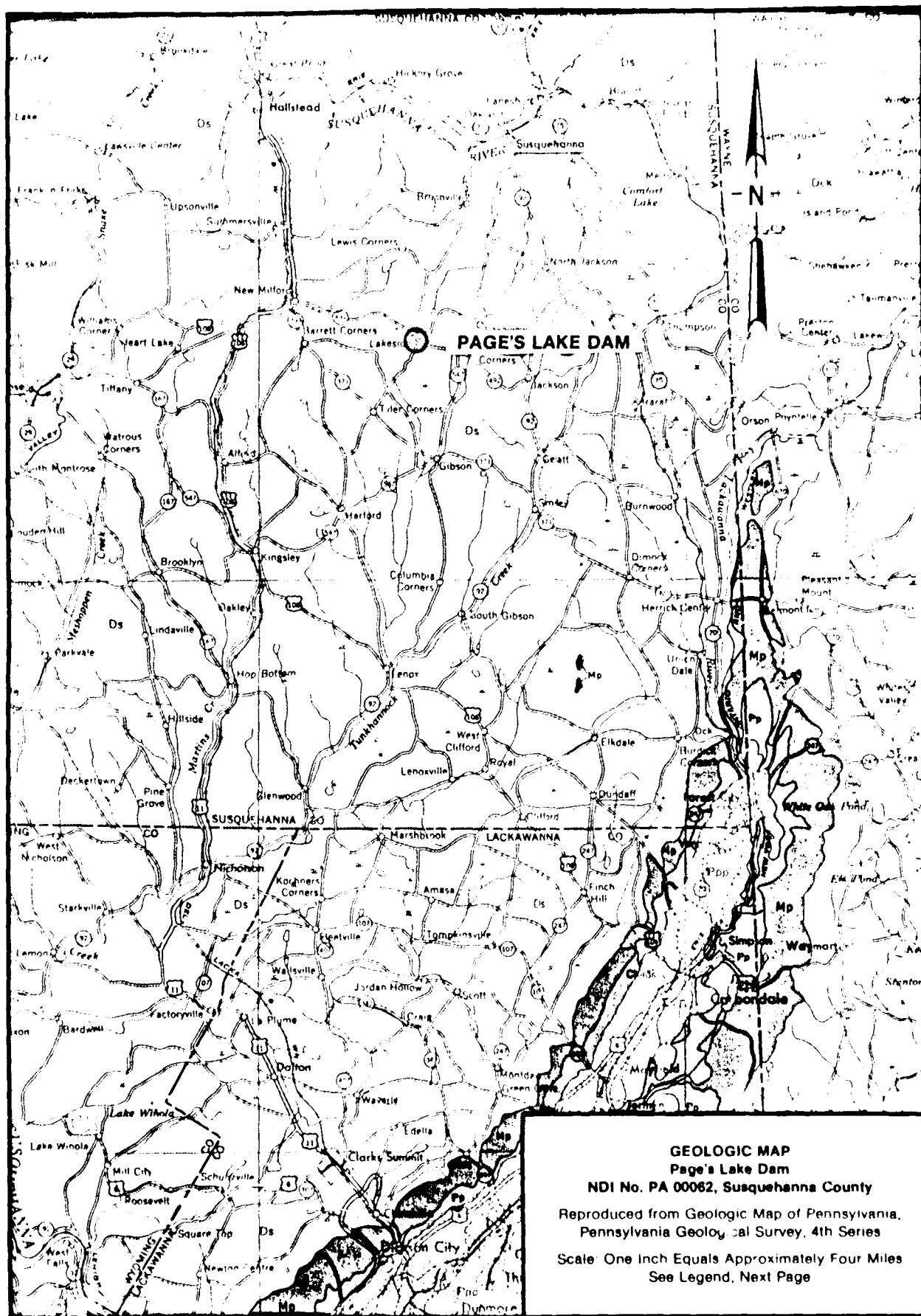
APPENDIX F  
REGIONAL GEOLOGY

PAGE'S LAKE DAM  
NDI No. PA 00062, PennDER No. 58-5

REGIONAL GEOLOGY

Page's Lake Dam is situated in the Glaciated Low Plateaus physiographic province. The area has undergone at least three stages of glaciation and is presently covered with Wisconsin Stage glacial deposits. According to the Soil Conservation Service's Soil Survey for Susquehanna County, the surface soils consist primarily of stoney, silt loams of the Morris-Wellsboro-Volusia association. No test boring data were available for review on this project, thus, the thickness of this overburden could not be ascertained.

Geologic references indicate that the bedrock in the vicinity of the dam consists primarily of members of the Catskill Formation in the Susquehanna Group. These are chiefly red and gray shales and sandstones of Upper Devonian age. The formation may also contain scattered, thin streaks of coal and scattered fish remains. The strata in the Page's Lake area were deposited in a bay or delta front environment and remain essentially horizontal after the Appalachian Uplift.



# GEOLOGY MAP LEGEND

## DEVONIAN

### UPPER

#### WESTERN PENNSYLVANIA



##### Oswayo Formation

Greenish gray to gray shale, sandstones and siltstones becoming increasingly shaly westward, considered equivalent to type Oswayo, Riverside Formation (in Erie and Crawford Counties) probably not distinguishable north of Corry.



##### Cattaraugus Formation

Red, gray and brown shale and sandstone with the proportion of red decreasing westward, includes Venango matrix of shales and Salamanca sandstone and conglomerate, some limestone in Crawford and Erie Counties.



##### Conneaut Group

Alternating gray, brown, greenish and purplish shales and siltstones, includes "pink rock" of shales and "Chemung" and "Carnegie" Formations of northwestern Pennsylvania.



##### Canadaway Formation

Alternating brown shales and sandstones, includes "Portage" Formation of northwestern Pennsylvania.

#### CENTRAL AND EASTERN PENNSYLVANIA



##### Oswayo Formation

Brownish and greenish gray, fine and medium grained sandstones with some shales and scattered calcareous lenses, includes red shales which become more numerous toward Relation to type Oswayo not proved.



##### Catskill Formation

Chiefly red to brownish shales and sandstones in beds gray and greenish sandstone, limestones named Elk Mountain, Honesdale, Shohola, and Delaware River in the east.



##### Marine beds

Gray to olive brown shales, graywackes, and sandstones, contains "Chemung" beds and "Portage" beds including Buckle, Butler, Haywell, and Trimmers Rock, Tully Limestone at base.



##### Susquehanna Group

Barbed line in "Chemung" Catskill, contact of Second Pennsylvania, Surber County reports barbed "Chemung" side of line.

### MIDDLE AND LOWER



##### Hamilton Group



##### Mahantango Formation

Brown to olive shale with interbedded sandstones which are dominant in places (Montebello, highly fossiliferous in upper part, contains "Centerfield coral bed" in eastern Pennsylvania).

##### Marcellus Formation

Black, fossiliferous, carbonaceous shale with thick brown sandstone (Turkey Ridge) in parts of central Pennsylvania.



##### Onondaga Formation

Greenish blue, thin bedded shale and dark blue to black, medium bedded limestone with shale predominant in most places, includes Seneca Limestone and Need more Shale in central Pennsylvania, Butterfield Falls Limestone and Escopus Shale in easternmost Pennsylvania, in Lehigh Gap area includes Palmerston Sandstone and Howmanstown Chert.



##### Oriskany Formation

White to brown, fine to coarse grained, partly calcareous, locally conglomeric, fossiliferous sandstone (Ridgely) at the top, dark gray, cherty limestone with some interbedded shales and sandstones below (Shirees).



##### Helderberg Formation

Dark gray, calcareous, thin bedded shale (Mandula) at the top, equivalent to Port Ewen Shale and Hecatt Limestone in the east, dark gray, cherty, thin bedded, fossiliferous limestone (New Scotland) with some local sandstones in the middle and, at the base, dark gray, medium to thick bedded, crystalline limestone (Cumant) sandy and shaly in places with some chert nodules.

